

Main Report

Report of the Expert Group for Modernization of Indian Railways



**Government of India
Ministry of Railways
(Railway Board)
February, 2012**



Government of India
Ministry of Railways
Expert Group for Modernizaion of Indian Railways

Shri Dinesh Trivedi,
Minister for Railways
Govt of India

New Delhi, Date: 25 Feb. 2012

Dear Sir,

Report of the Expert Group for Modernizaion of Indian Railways

We are pleased to submit the report on Modernization of Indian Railways - by the Expert Group constituted by Ministry of Railways through a notification dated 21-09-2011. Indian Railways is in urgent need for modernization and generational change to assure safety, improve productivity, take advantage of advanced technology, respond to ever increasing demand and meet inclusive growth aspirations of the country.

In order to prepare a plan the Expert Group had a series of consultations with the Railway Board, domain experts, Industry leaders, Labor leaders, Planning Commission and others. We focused on a five pronged strategy related to Core assets, New revenue models, Projects, Enablers and Resource mobilization. We also focused on 15 key areas related to Tracks, Signaling, Stations and Terminals, PPP, Land, Dedicated Freight Corridors, Information and Communication Technology, Indigenous development, Safety, Funding, Human Resource and Organization. It is important to keep in mind that Safety and Modernization are two faces of the same coin. In order to make Railway safe it needs to be modernized and to modernize it is to make it not only efficient and productive but also safe.

Modernization plan proposed by the Expert Group requires funding of Rs. 560,000 Crores in the next five years. Arranging funding for the entire plan is crucial even though the amount involved appears large and daunting. We believe it is possible to raise this amount to implement the plan fully if immediate measures are initiated to ensure that the four main sources of funds namely – Budgetary support, Internal generation by Railways, Monetization of blocked assets coupled with resort to PPP and Fund raising from Financial institutions and Markets, domestic as well as international, are harnessed concurrently in a timely manner. Simultaneously substantial change is required in Organization, Human resource and Administrative and Financial culture conducive to PPP, along with mission mode approach in all 15 key areas to assure timely implementation.

At present, Indian Railways is close to falling into the vicious circle of diminishing efficiency, falling safety standards, eroding share in national freight and passenger traffic and possibly ending up as a burden on the national economy instead of being its bulwark and vital support. This downtrend must be arrested now so that the Indian Railways becomes operationally and financially sound, perform its due role in the national growth serving as a life line and making noticeable contribution to national GDP.

Recommendations (113 in 15 key areas) of the Expert Group are really a call to action. It is time to act and implement these recommendations now.

Shri Sam Pitroda,
Chairman

Shri Deepak Parekh,
Member

Shri M.S.Verma,
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Dr. Rajiv Lall,
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Shri G. Raghuram,
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Shri Vinayak Chatterjee,
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Report of the Expert Group for Modernization of Indian Railways

Introduction

Indian Railways (IR) is the third largest railway network in the world with 7,083 railway stations, 1,31,205 railway bridges, 9000 locomotives, 51,030 passenger coaches, 2,19,931 freight cars and 63,974 route kilometers. Today IR operates 19,000 trains each day, comprising 12,000 passenger trains and 7,000 freight trains. It transports 2.65 million tonnes of freight traffic and 23 million passengers every day and 7.2 billion passengers per year. It currently has 1.36 million employees and an annual revenue base of Rs.1,06,000 crores as projected on March 31,2012. Indian Railways is also home to great talent and excellent organization focused on operation, efficiency and safety.

The country presently suffers from a severe and chronic under-investment in railway infrastructure. The resultant disproportionate diversion of freight and passenger traffic to roads while causing substantial loss in revenue to the Indian Railways also imposes a heavy burden on the country which is measurable in terms of a much larger freight cost to GDP ratio and higher environmental cost per route Km of Freight and passenger traffic than in other countries. Undeniably there is an urgent need to enhance capacity of and modernize the Indian Railways to meet country's social and economic aspirations in the 21st Century. With modernization and restoration of balance in the inter-modal transport mix railways can be a significant engine of inclusive growth and development for the country and can potentially contribute an additional 1.5% to 2% to GDP. IR will then, create new jobs, save energy, improve environment, while moving people, raw material and goods more efficiently nationwide. Highly critical industrial inputs like coal which contributes nearly 45% to Railways freight traffic will get the much needed special attention as a modernized Railway system will focus on efficient evacuation, movement, and delivery of coal or other important goods in a much more effective manner.

Leveraging new opportunities would, however, require generational change with bold vision, clarity and various new initiatives to look beyond day-to-day operations towards building next generation technologies, network, system and processes necessary to significantly enhance safety, productivity, efficiency and quality. At present, we have a unique window of opportunity, which must be capitalized with a sense of urgency to transform railways to deliver timely benefits to the people and the nation.

In order to evaluate options and make key necessary recommendations for modernization, the Ministry of Railways constituted an Expert Group for "Modernization of Indian Railways". The details of the constitution and the Terms of Reference of the Group are attached in **Annexure 1**.

Methodology

The Expert Group first met with the Hon'ble Railway Minister Mr. Dinesh Trivedi and the Railway Board to understand the current status, objectives, challenges and opportunities. The Group also reviewed the Indian Railways Vision 2020 document as well as previous reports and recommendations on Railway reform including the Prakash Tandon Committee Report (1994) and the Rakesh Mohan Committee Report (2001) etc. This was followed by a review of the financial status and opportunities of the railways with the Finance Commissioner and other Board Members. The Group also had detailed discussions with Advisers, Domain Experts, individually and collectively, as well as interactions with the Safety Committee, Industry leaders, labour leaders, representatives of the Planning Commission and other stakeholders. Based on many discussions, perception, priorities and programs, 11 Working Groups consisting of domain experts from Railways were organized to analyze specific verticals. This was followed by the review and discussion of presentations submitted by the Working Groups to integrate into the overall modernization plan.

*(Terms of Reference and composition of the 11 Working Groups is provided in **Annexure II** and the detailed whitepapers and presentations of the Working Groups are compiled in Vol. II of the report hereof)*

Strategy

To recommend ways and means to modernize Indian Railways the Group focused on two fundamental drivers **SAFETY** and **GROWTH** and a five-pronged strategy:

- Modernize Core Assets:** There is an urgent need to modernize the key revenue generating assets of the railways such as tracks and bridges, signaling, rolling stock and stations and terminals.
- Explore New Revenue Models:** To meet the funding needs for modernization and growth it is important to look at opportunities related to PPPs, land and airspace utilization, dedicated freight corridors, and high speed trains.
- Review Projects:** To ensure financial viability, social benefits and timely implementation it is imperative to review and assess capital projects sanctioned and work-in-process and suggest necessary priorities and appropriate actions.
- Focus on Enablers:** For a holistic and long term approach to modernization and execution there is a need to focus on key enablers such as ICT, indigenous development and safety.
- Mobilize resources:** For railways to capitalize on this timely opportunity it is important to mobilize substantial additional funding, strengthen human resources and revamp organizational structures.

Based on the five-pronged strategy '**15 focus areas**' were identified and selected as illustrated in Exhibit 1 to drive Modernization:

Exhibit 1 – ‘15 Focus areas’				
Core Assets	1.0 Track and Bridges	Signaling	Rolling Stock	Stations & Terminals
Revenue Models	PPPs	Land	Dedicated Freight Corridors	High Speed Trains
Projects	Review of existing and proposed Projects			
Enablers	ICT	Indigenous Development	Safety	
Resources	Funding	Human Resource	15.0 Organization	

Recommendations

To modernize Indian Railways, we submit the following 15 sets of recommendations:

1.0 Track & Bridges

- 1.1 Modernize 19,000 kms of existing tracks (of routes A, B & D special): A, B and D special routes (refer **Annexure III** for details) comprise nearly 40% of the total network and carrying about 80% of the traffic. It should be upgraded with strong and robust track capable of carrying heavier freight trains at 25 tonne axle load and achieving higher speeds of 75/100 kmph. The tracks on A & B routes should be fit for passenger speeds of 160/200 kmph.
- 1.2 Eliminate level crossings and Provide fencing alongside tracks: Upgradation of tracks would also require elimination of level crossings and replacement by ROBs/ RUBs *(It is proposed that initially IR should focus on Delhi-Mumbai and Delhi-Kolkata sections as these routes will be relatively free from freight trains due to commissioning of DFCs. As a part of DFC, elimination of level crossings on parallel alignment i.e. Vadodara to Mumbai and Khurja to Kolkata is already planned. Therefore for modernization, IR only needs to focus on Delhi-Vadodara and Delhi -Khurja sections. As a rough estimate, Rs. 4000 crores would be required to build ROBs, limited height subways and manning of the unmanned level crossings).*

It would also require fencing alongside the tracks for access control. *(Fencing of track will be of two types. In urban, semi urban and other habitation we need robust fencing. It will cost nearly Rs 40 lakhs per km. In rest of the areas we need light fencing to prevent cattle. It will cost Rs 10 lakhs per km. Total cost of fencing will be about Rs 1000 crores).* Further, modern maintenance practices and reliable safety standards should be introduced for these tracks.
- 1.3 Strengthen 11,250 bridges to sustain higher loads at higher speeds: It may be noted that out of 1.31 lakh bridges, around 25% are over 100 years old. 11,250 bridges on A, B and D special routes will require strengthening.
- 1.4 Provide 100% Mechanized track maintenance on Routes A and B: This would provide for superior quality of track laying and maintenance.

We feel that these measures will increase throughput capacity of freight trains by 10% as well as increase the net revenue per freight train by 30%. This would also enhance the life of rails from 525 GMT to 800 GMT and ensure strong and robust track for heavier freight trains at higher speeds. The cost of the above mentioned initiatives is estimated as Rs. 33,046 crores and should be completed in 5 years.

2.0 Signaling

- 2.1 Implement Automatic Block Signaling on A and B routes with Train Management System
- 2.2 Provide communication based train control like Moving Block System on C class routes of Central and Western Railways
- 2.3 Deploy on-board train protection system with cab signaling on A & B routes
- 2.4 Introduce GSM-based mobile train control communication systems on 'A', 'B' & 'C' routes
- 2.5 Establish Centralized Maintenance Control Centers

This would substantially improve the safety of workers and passengers as well as generate a 30% increase in capacity and associated revenue potential. The cost is estimated as Rs. 25,000 crores and should be completed within 5 years.

3.0 Rolling-stock

Modernize Rolling stocks with investments in the following:

- 3.1 New generation locomotives:
 - Electric locomotives (9,000 & 12,000 HP)
 - High horse power diesel locomotives (5,500 HP)
- 3.2 Traction development for improvement in fuel efficiency, emission & reliability
- 3.3 High speed potential LHB coaches (160/200 kmph)
- 3.4 Upgraded suburban coaches
- 3.5 Train sets for high speed inter-city travel
- 3.6 Modern high pay to tare ratio wagons
- 3.7 Green toilets on all passenger trains
- 3.8 Heavy haul freight bogies

These investments would substantially increase revenue potential and improve safety, efficiency and passenger comfort. The above efforts will also lead to capacity enhancement, enhanced asset utilization and increased productivity. The cost of the above mentioned initiatives is estimated at Rs. 72,571 crores (refer **Annexure IV** for detailed break up of each item) and should be completed within 5 years.

4.0 Stations & Terminals

- 4.1 Modernize 100 major stations out of the total 7083 stations immediately.

A total of 770 stations should be targeted for redevelopment in the next 10 years.

- 4.2 Develop 34 multi-modal logistics parks at identified locations to provide integrated transport infrastructure facilities for users.
- 4.3 Modernize existing Railway Freight Terminals-Take up top 50 terminals.
- 4.4 Enhance customer amenities and services at stations and on trains, with special provisions for physically challenged passengers

The above efforts would lead to substantial revenue generation, improved management & customer services as well additional traffic due to new logistic parks & modern terminals. The estimated funding requirements would be approximately Rs. 1,10,000 crores for redeveloping the proposed 100 stations (*estimated as Rs. 2,000 crores per station for the top 30 stations; Rs. 1,000 crores per station for the next 30 stations and Rs. 500 crores per station for the remaining 40 stations*) and Rs. 17,000 crores for development of 34 multi-modal logistics parks and modernization of existing freight terminals. The time period for completion should be 5 years.

5.0 PPP Initiatives

Develop PPP models in various areas of Railways to attract private investment to augment core capabilities related to:

- 5.1 Stations and Terminals
- 5.2 High speed rail corridors
- 5.3 Elevated rail corridor
- 5.4 Private freight terminals
- 5.5 Leasing of wagons
- 5.6 Loco and coach manufacturing units
- 5.7 Captive power generation
- 5.8 Renewable energy projects (solar, wind etc.)
- 5.9 Railway Hospitals
- 5.10 Railway Schools
- 5.11 Merchandizing

The above initiatives should provide significant additional resource mobilization, lead to speedy growth and augmentation of railway capabilities and improve collaboration and efficiency. The total cost of the

above mentioned initiatives excluding stations & terminals and Dedicated Freight Corridors is estimated as Rs. 97,000 crores (refer **Annexure V** for detailed break up of each item). *This cost estimate does not include costs of stations redevelopment, logistics parks and dedicated freight corridors.*

6.0 Land & Airspace

Leverage and Monetize Land and Airspace:

- 6.1 Conduct GIS Mapping of land resources available with IR expeditiously
- 6.2 Complete digitization of land records and perfection of titling at the earliest
- 6.3 Obtain policy concessions from Government of India (GOI). For long term lease and licensing by Railways, land rights must belong to them. *A special dispensation from the concerned government ministries, departments and agencies at the central, state and local levels would be critical for successful commercial exploitation of surplus land by the IR.*
- 6.4 Garner state government support for land use and higher FSI.
- 6.5 Monetize Land assets through creative PPP initiatives
- 6.6 Monetize Airspace above the platforms & rail tracks: a pilot project could be immediately taken up in the Mumbai suburban railway system to monetize the air space
- 6.7 Set up SPV, if required more than one, to handle Land and Airspace

This would generate additional resources, lead to efficient utilization of land and airspace as well as ensure speedy development, growth and improved customer service. Monetization of surplus land and airspace could mobilize Rs 50,000 crores for IR. *(at a conservative estimate of Rs 5 crores per acre for 10,000 acres of surplus land which has been identified in urban centres for commercialization).* A part of this can be received as an upfront payment and the rest through periodic lease revenues.

7.0 Dedicated Freight Corridors (DFCs)

- 7.1 Construct Eastern and Western Dedicated Freight Corridors (3,338 Kms) in the next 5 years
- 7.2 Construct North-South, East-West, East-Coast and Southern Dedicated Freight Corridors (6,200 Kms) in the next 10 years
- 7.3 Upgrade feeder routes to DFCs (6,000 kms) for 25 tonne axle load train running

These initiatives would lead to segregation of freight and passenger traffic on trunk routes, improvements in service delivery, and generate additional freight carrying capacity of about 2,400 million tonnes through Eastern & Western DFC. It would also ensure higher average speeds of freight trains (expected to increase to a level of 60 kmph from the current average of 25 kmph).

The total cost of this is estimated at Rs. 2,04,000 crores for all the corridors. The proposed timeframe is 5 years for Eastern & Western DFC and 10 years for North-South, East-West, East-Coast and Southern Dedicated Freight Corridors.

8.0 High Speed Passenger Train Corridors

- 8.1 Construct a High Speed railway line between Ahmedabad & Mumbai with speed of 350 kmph.
- 8.2 Undertake detailed studies for 6 other High Speed rail corridors already identified. These include: (1) Delhi-Chandigarh-Amritsar (450 km); (2) Hyderabad-Dornakal-Vijayawada-Chennai (664 km); (3) Howrah-Haldia (135 km); (4) Chennai-Bangalore-Coimbatore-Ernakulam (850 km); (5) Delhi-Agra-Lucknow-Varanasi-Patna (991 km) & (6) Ernakulam-Trivandrum (194 kms). The likelihood of initiating projects in these corridors in next 5 years is low and so no attempt has been made to estimate the cost of these projects.

This would lead to increased connectivity, traffic and faster intercity travel. The cost of the high speed line between Ahmedabad & Mumbai is estimated as Rs. 60,000 crores. *This cost has also been included under the PPP initiatives. The proposed timeframe is 10 years.*

9.0 Review of Projects

- 9.1 Expedite implementation of following 'priority projects':
 - 9.1.1 101 projects in advanced stage of completion where 50% to 90% of the investments have already been made.
 - 9.1.2 Projects already sanctioned-rail tracks: Out of a total of 340 rail track projects [new line (129), gauge conversion (45) and doubling (166) projects] of total track length 33,133 km, the following would be taken up as priority projects:
 - 9.1.3 115 doubling projects covering a length 6643 km (sanctioned)
 - 9.1.4 15 new line/gauge conversion projects covering a length 700 Km (sanctioned)
- 9.2 Sanction Project for-rail tracks: 15 new line/doubling projects covering a length 3,092 km (not sanctioned)
- 9.3 Implement Electrification of 7,500 RKM in the next five years.
- 9.4 Add 10,000 km of new lines in the next 5 years: *These new lines are to largely achieve social inclusion and would not be remunerative.*
- 9.5 Provide funds for non-viable projects being implemented purely for social inclusion through a special fund set up by GOI for this purpose. Reimburse O&M deficit determined through transparent accounting and agreed to by the regulator.

- 9.6 Provide the 'first' and 'last mile' connectivity by creating appropriate policy framework.
- 9.7 Identify and commission in a mini mission mode bypasses at junction stations and rail flyovers for grade separation.

The above initiatives would lead to increased access in remote areas, additional effective broad gauge rail trackage of nearly 24,000 track kms in 5 years and additional electrified tracks of 7500 RKM. The cost estimate is Rs. 53,827 crores for 'priority projects' (refer **Annexure VI** for breakup of investments) and Rs. 1,00,000 crores for construction of new lines. The proposed timeframe is 5 years.

(Both of these estimates are not included in the total estimates for modernization and need to be completely provided for under the 12th FYP.).

10.0 Information and Communication Technology (ICT)

- 10.1 Set up Real Time Information Systems (RTIS) to provide real time information at stations and on running trains
- 10.2 Set up Radio frequency identification (RFID) tracking system for wagons, coaches and locomotives to enhance wagon management and real time monitoring
- 10.3 Provide internet access at 342 railway stations (58 'A1' class & 284 'A' class) immediately
- 10.4 Establish unified IP-based ICT platform for 6000 railway stations
- 10.5 Review CRIS and integrate into IP-based ICT agenda
- 10.6 Leverage and expand Railtel optical fiber network
- 10.7 Use ICT to modernize Organization, Management, Development, Finance, Project Management, Research, Procurement, Payment etc.
- 10.8 Introduce e-file to computerize Railway files and expedite decision making
- 10.9 Introduce Mobile ticketing & commerce for a variety of Railway applications
- 10.10 Upgrade & Integrate Railway websites and use social media creatively for customer feedback, consumer education and social messages

This would lead to improvement in wagon utilization and availability by 10%; efficient tracking of trains, locomotives and cargo; enhancement of communication services (voice, data & video services) and improvement in quality of passenger services. Further, it would provide across the board benefits to both customers and railways. Customers will benefit from improved on board information, station security, safety, services and facilities while railways will benefit from resource mobilization using innovative business models and safety and security of its passengers and assets. The total cost of these initiatives is estimated as Rs. 1,315 crores (refer **Annexure VII** for details) and should be completed in 1 to 4 years.

11.0 Indigenous Development

- 11.1 Develop substantial indigenous capabilities to be a global leader in:
 - State-of-the-art railway technologies
 - Railway Components and equipment for global markets
- 11.2 Establish Indian Institute of Railway Research with Centers of Excellence in:
 - Safety
 - Wagon prototyping
 - Mechatronics
 - Green toilets, etc
- 11.3 Upgrade existing railway R&D facilities
- 11.4 Strengthen RDSO to build local capabilities
- 11.5 Upgrade indigenous manufacturing (foundry facilities for higher axle load bogies)
- 11.6 Develop Indian Standards, critical vendors and protocols for Railways
- 11.7 Enhance University Interface with Railway Laboratories in Academic Institutions

A focus on strengthening indigenous capabilities will increase local production and domestic manufacturing as well make India a hub for technology, equipment and services export globally. Total cost of these initiatives is estimated as **Rs. 464 crores** (refer **Annexure VIII** for details). Implementation could commence immediately and be scaled up on the basis of the results of the pilots. *Research Design and Standards Organization (RDSO) is currently undertaking 100 R&D projects in rail related technologies under the proposed 12th FYP with estimated spending of Rs. 2,206 crores.*

12.0 Safety

- 12.1 Deploy latest track machines for mechanized maintenance of track
- 12.2 Install wheel impact load detectors
- 12.3 Modernize and renovate railway workshops
- 12.4 Equip trains with Train Protection Warning System (TPWS)
- 12.5 Install vehicle borne digitized and recordable ultrasonic flaw detectors to cover the entire railway system
- 12.6 Eliminate unmanned level crossings by manning, closure, merger, construction of over bridges and underpasses
- 12.7 Upgrade coaching depots

- 12.8 Upgrade disaster management facilities & related Services
- 12.9 Upgrade Network Management Centers
- 12.10 Use Social networks/cameras/Videos and other new tools and technologies extensively for safety & Security

The benefits of these measures would be enhanced safety and security for passengers and railway workers. Total cost of the above initiatives is estimated as **Rs. 39,836 crores** (refer **Annexure IX** for details). *However this cost is not included in the total estimates for modernization since a separate committee on Safety has been set up by the IR under Dr. Kakodkar.*

13.0 Funding

- 13.1 Mobilize total investment requirements of Rs. 5,60,396 crores for the proposed modernization initiatives.

Railway sub-group of XIIth five year plan has estimated additional requirement of Rs. 4,42,744 crores for various other investments proposed to be undertaken during the 12th FYP and not covered under modernization initiatives. Table 2 below provides a summary of the total investment requirements (both for modernization and as recommended by the XIIth plan sub-group on Railways):

- 13.2 Outline an investment of Rs 8,39,000 crores, during the XIIth FYP, which includes Rs 3,96,000 crores of modernization plan investment recommended by us. It is a quantum jump from investment levels of Rs 2,03,000 crore in the XIth plan and Rs 84,000 crore in the Xth plan.
- 13.3 Based on the discussion with various stakeholders the Committee recommend the funding pattern given in table 3 below - see page 13. [The main sources of funds for IR are internal generation (revenue surplus), gross budgetary support (on which IR currently pays an annual dividend of 5%) and extra budgetary resources comprising market borrowings, bonds and PPPs.]

Follow the following funding pattern and bridge the gap of **Rs. 16,469 crores** from the following sources:

- a. Disinvestment in Railway PSUs.
- b. Re-densification/ commercialization of surplus land in existing railway colonies in different locations. A few pilot projects could be immediately explored.
- c. Commercial exploitation of railway schools and hospitals, without displacing any of the priorities from the point of view of IR employees. Management contracts (on the basis of revenue sharing) could be tried for some of the larger hospitals/ schools with a view to achieve significant upgradation of standards.
- d. Modernization surcharge from passengers on a per passenger km basis.

Table 1: Total investment requirements for Modernization

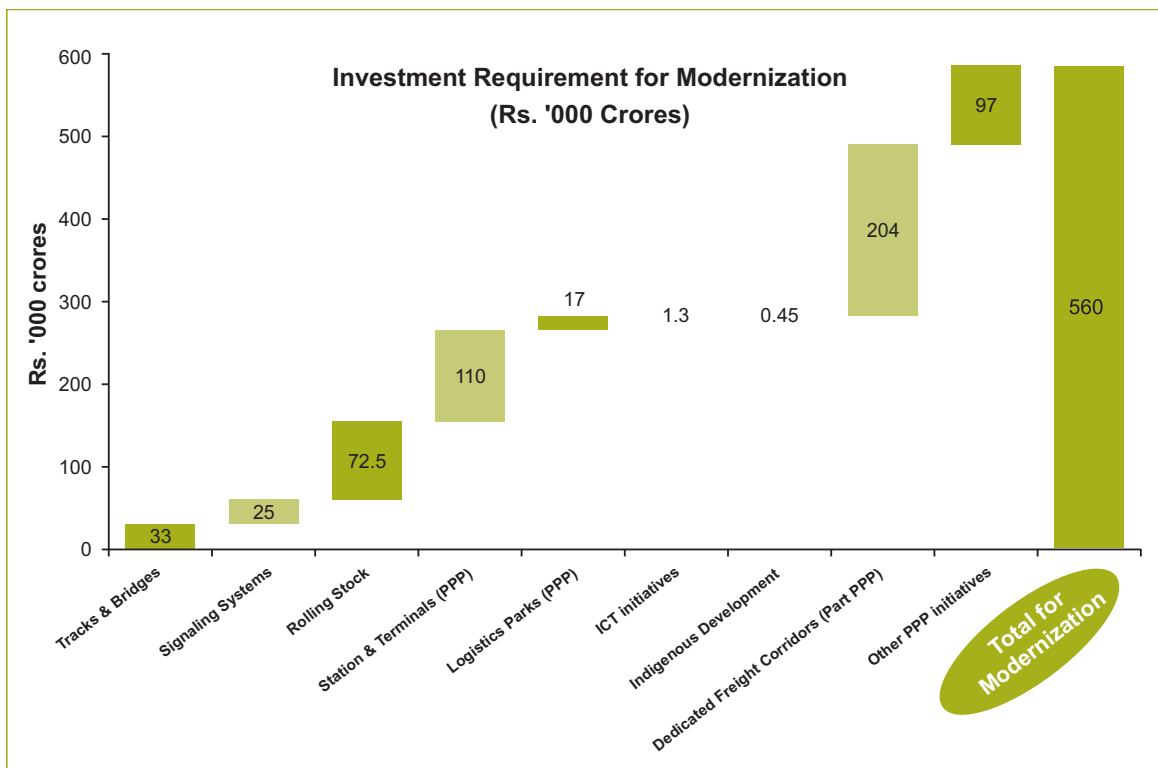


Table 2: Summary of Total Investment Requirements

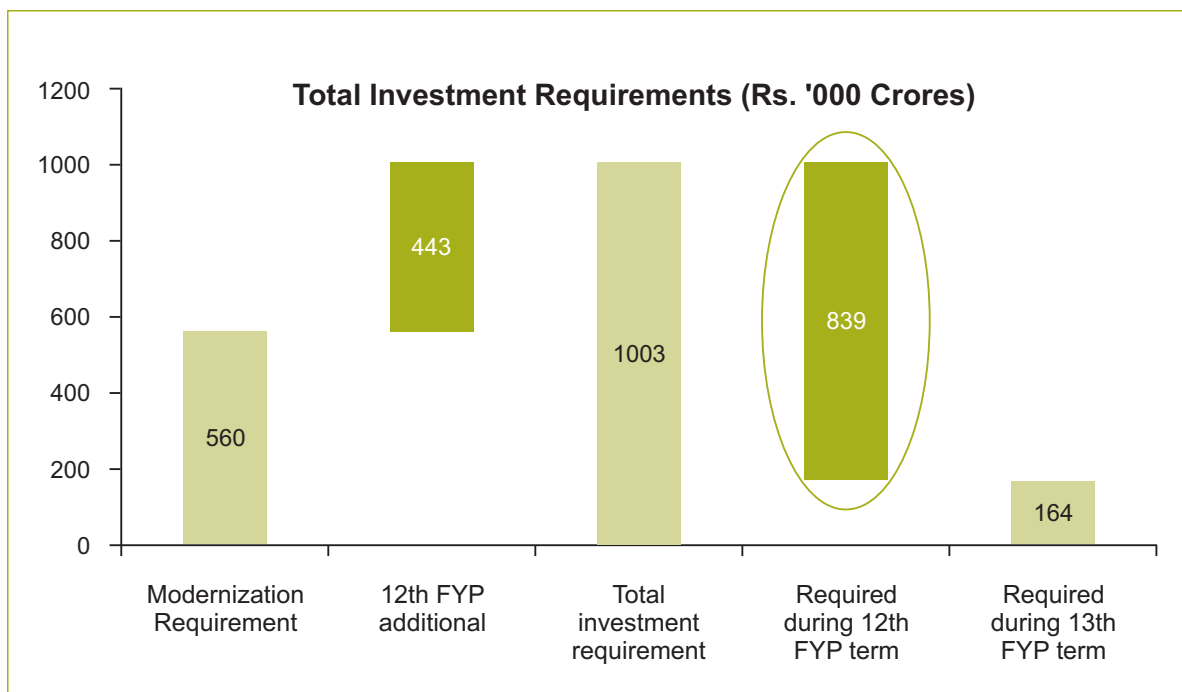


Table 3: Sources of funds to raise the amount of Rs. 8, 39,140 crores required in the next 5 years:

Sources of Funds (Rs. in Crores)		
S. No.	Sources of funds	Rs. in crores
1.	Gross Budgetary Support	250,000
2.	Internal Generation	201,805
3.	Leasing/Borrowings	101,000
4.	PPPs	229,024
5.	Dividend rebate	24,000
6.	Road Safety Fund	16,842
	Total	822,671

Table 4: Gap in Applications & Sources of Funds:

S. No.	Gap in Application and Sources of funds	Rs. in crores
1.	Total investment requirements	839,140
2.	Sources of Funds	822,671
	Gap to be funded	16,469

13.4 Source through PPP the balance requirement of Rs 164,000 crore of the modernization plan to be included in the XIIIth plan. This makes the total PPP funding for the modernization plan as Rs 3,93,000 crores. Details of PPP investment and source of revenue through PPP are indicated in **Annexure X**.

13.5 Create a separate **‘Modernization Fund’** on the lines of SRSF to fund these initiatives in a sustainable manner.

14.0 Human Resource

- 14.1 Install and operationalize immediately modern Computerized Human Resource Management System with data base and inventory/Resume of all present employees and skills required to meet modernization plan
- 14.2 Reduce and gradually eliminate induction of unskilled staff
- 14.3 Create and impart specialized courses in partnership with academic institutions and others especially for Vocational Education, Supervisors and Management
- 14.4 Launch a series of in-service training programs immediately
- 14.5 Rationalize and consolidate multiple services and cadres without sacrificing the benefit of specialization and business capabilities
- 14.6 Offer graduate programs in Railway technology at IITs and Railway management at IIMs
- 14.7 Enable lateral recruitment from market for specialist functions
- 14.8 Upgrade ICT skills of present officers and employees substantially
- 14.9 Review and Restructure existing training institutions for improving ecosystem and Modernization
- 14.10 Review Railway Health System separately to meet aspirations of Railway Families and Modernization plans
- 14.11 Create a system of reward for collective performance and variable pay linked to incremental surplus generated by various units

15.0 Organization

Organizational reforms are essential to ensure that IR is able to achieve the goals set out for modernization. The structure of the IR has remained largely unchanged for decades and it remains a functionally oriented institution that is organized around its cadres instead of around its businesses or customers¹.

The following organizational reforms are recommended to empower officials, speed up the decision-making process and introduce professional project management systems in IR.

- 15.1 Re-organize Railway Board along business discipline to reflect Chairman as Chief Executive Officer and Members for
 - Safety
 - Business development/ Commercial

- Technology/ ICT & Signaling
- Freight
- Passenger Services
- Infrastructure
- Finance
- HR
- PPP

- 15.2 Create commodity wise Key Account Directors under Member Freight for major commodities like coal, iron ore, steel, foodgrain, fertiliser etc. Coal is 45% of total freight traffic and needs special attention.
- 15.3 Create Key Account Directors of suburban, long distance passenger etc. under Member Passenger.
- 15.4 Ensure autonomy, flexibility and accountability at all levels with clear P&L responsibilities
- 15.5 Make provisions for handling of all parliamentary functions (liaison functions with government, including handling of Parliament questions) by a Joint Secretary level officer in the Ministry, which would set the RB free to focus exclusively on business issues.
- 15.6 Empower Zonal Railways along with accountability:
 - The present system of seeking sanction for Capital investment to be included in the Works and Rolling Stock Programs of railways from the Railway Board/ Ministry should give way to a more decentralized decision-making in critical areas like safety, traffic facility, passenger amenity and other areas, by delegation of powers at the zonal level.
 - GMs of Zonal Railways to be empowered to take decisions, within a framework of rules and investment limits. The Zonal Railways should also be made accountable for return on capital, transport output, profitability and safety.
- 15.7 Revamp accounting systems so that separation between the cost of infrastructure services and the operational activities and rational pricing is achieved and train-wise, route-wise profitability analysis is available. This would help assess the usage charge of infrastructure and rolling-stock resources and also in accurate allocation of overheads. This would also help in computation of the cost of operation of trains and services and appraisal of profitability of various business lines.
- 15.8 Re-engineer Business Processes to streamline the decision-making process to bring about accountability, result-orientation and responsiveness at all levels and develop IT tools with this objective in mind.
- 15.9 Modernize procurement processes and benchmark products and suppliers

¹ Report of the Expert group on Indian Railways, 2001 (under Dr. Rakesh Mohan)

- 15.10 Review the existing PPP policy framework in the light of hitherto poor response and PPP experience.
- 15.11 Create a post of Member (PPP) responsible for project development and processing of all PPP projects to facilitate their speedy sanction by the Government and award of concession. The Member should have a multi disciplinary team of officers, including finance, to deal with various railway projects.
- 15.12 Establish a Committee for approval of PPP projects to be headed by Chairman Railway Board with Financial Commissioner, Member (PPP) and the concerned member to whose area of responsibility the project belongs. The process and procedure followed should be similar to that of PPPAC followed in Government of India. The Board should decide and approve the projects and they should not be examined or referred back by the members to their respective directorates. The projects thereafter should follow the normal procedure of approval by PPPAC and CCI.
- 15.13 Appoint a 'PPP Ombudsman' to resolve any disputes that may arise between the private sector and the government in interpretation and enforcement of provisions of the agreements. The Ombudsman should be a quasi judicial authority and should have the authority to give directions which are binding on all parties.
- 15.14 Constitute a Railways Tariff Regulatory Authority in order to provide a level playing field to all stakeholders.
- 15.15 Establish a separate Authority/SPV/Organization for implementation of Major Projects such as development of high speed corridors, redevelopment of railway stations etc.
- 15.16 Build capacity for the officers at the Zonal railways to manage PPP projects. A PPP cell should be constituted in each zone to identify, develop, implement and monitor projects at the zonal level.
- 15.17 Computerize all Railway business/ operations including financial management, inventory, HR and other assets
- 15.18 Implement 'Mission Mode' approach for all 15 focus areas with clear objectives, measurable milestones, tangible deliverables, and well defined timelines.
 - Each of the 15 Missions should be headed by a Mission Director for a three-year term, with autonomy to take decisions in their respective areas.
 - All the Mission Directors and associated teams should report to the Railway Board.
 - Each Mission should be provided with appropriate budget and operational autonomy to implement.
 - Each Mission Director should use standard project management tools to manage and monitor.
- 15.19 Set up a High Level Committee to facilitate co-ordination amongst the 15 missions, fast-track implementation and address bottlenecks, coming in the way of implementation.

Summary

In summary, we have tried to simplify as much as possible the complex task of modernizing the massive Indian Railways system with multiple priorities, many challenges and varied perceptions. We realize that the task is very complex and requires political will, organizational / management support, substantial funding, new direction, new thinking, mobilization of resources, innovative PPP and new business models, and a lot more. We strongly believe that through this modernization plan Indian Railways can add an additional 1.5 to 2% to national GDP and fuel growth and prosperity in the next decade. We also believe that at this time Indian Railways must keep clear focus on Safety and Growth with a five pronged strategy and multiple initiatives to capitalize on core assets, generate new revenue models, review current and new projects, focus on enablers and mobilize resources.

We have made a total of 113 recommendations. Our recommendations in 15 areas are critical for the kind of generational change Railways require. To implement these recommendations, as suggested above, 15 individual Missions are required with substantial resources, leadership, plans, autonomy, freedom, flexibility and advance program management tools and technology to execute. It will also require several mini and micro Missions within each Mission Directorate to implement multiple tasks. Similarly, organizational reforms suggested by us are critical to mobilize resources, provide policy direction and ensure time bound implementation. Based on our analyses and interactions with the Planning Commission, we strongly believe that it is possible to mobilize financial resources to meet substantial growth needs in the Railways.

To build consensus we have had a series of interactions with all key stakeholders and we thank each one of them for their support, input and advice, especially Railway Minister, Chairman Railway Board, FC, Members, Advisers, domain experts, industry leaders, labour leaders, Planning Commission etc. Our interactions with the Railway officers and experts have convinced us that generational change as proposed by the Expert Group is possible. DMRC has shown us that with the right leadership, autonomy, flexibility and accountability it can be done. We are individually and collectively available as an Expert Group to discuss these recommendations and provide our help and support in speedy implementation.

Finally, we strongly recommend that the next **Railway Budget** should focus on the modernization plan with a vision for a generational change to take Indian Railways to new heights with commitment to Safety and Growth for all.



Shri Sam Pitroda,
 Chairman
 Adviser to Prime Minister of India



Shri Deepak Parekh,
 Member
 Chairman, HDFC Bank



Shri M.S.Verma,
 Member
 Former Chairman, State Bank of India



Shri G. Raghuram,
 Member
 Professor, IIM, Ahmedabad



Dr. Rajiv Lall,
 Member
 Managing Director, IDFC



Shri Vinayak Chatterjee,
 Member
 Chairman, Feedback Infrastructure Services Ltd



Shri Ranjan Jain,
 Secretary
 Adviser (Infra.), Railway Board

Expert Group Members



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 Member
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 Services Ltd



Shri Ranjan Jain,
 Secretary
 Adviser (Infra.), Railway Board

■ Annexures

Annexure I

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
RAILWAY BOARD

No.ERB-I/2011/23/39

New Delhi, dated 21.9.2011

ORDER

The Ministry of Railways (Railway Board) have decided to constitute an Expert Group for ‘Modernization of Indian Railways’ consisting of the following:-

1.	Shri Sam Pitroda, Adviser to Prime Minister of India	Chairman
2.	Shri Deepak Parekh, Chairman, HDFC Bank	Member
3.	Shri M.S.Verma, former Chairman, State Bank of India	Member
4.	Shri G. Raghuram, Professor/IIM, Ahmedabad	Member
5.	Dr. Rajiv Lall, Managing Director/IDFC	Member
6.	Shri Vinayak Chatterjee, Chairman, Feedback Infrastructure Services Ltd	Member
7.	Shri Ranjan Jain, Adviser(Infra.), Railway Board	Secretary

1. Purpose of the Committee

- (i) To recommend ways and means to modernize Indian Railways to meet the challenges of economic growth, the aspirations of the common man, the needs of changing technology and the expanding market, while at the same time ensuring adequate focus on addressing social and strategic requirements of the country in consonance with Indian Railways’ national aspirations.
- (ii) Address issues connected with organization, management and resource mobilization, and professionalization of manpower.

2. The Terms of Reference of the group will be as under:-

I. Railway Modernization with a focus on:

- (i) Track

To provide capability for safe, secure and productive freight and passenger trains with a focus on expansion and excellence.

(ii) Signaling

Modern electronic signaling technologies for maximizing track utilization, and for providing high speed operations with safety.

(iii) Rolling stock

Expansion of new generation freight and passenger rolling stock with advanced technological features with capability for higher speeds and lower unit costs.

(iv) Stations & Terminals

Modernization of stations and freight terminals to provide comprehensive, state-of-the-art infrastructure, services and facilities.

II. Information technology

Launch integrated initiatives for exponential improvement in operational efficiency, safety, flexibility and comfort.

III. Indigenous Development

Outline strategies for indigenous development, local R&D and local manufacturing to augment existing capacities of Indian Railways.

IV. Project Review

Review and assess capital projects sanctioned and work-in-process and suggest necessary actions.

V. PPP

Address issues related to PPP with a focus on process-management, bidding-out procedures, resource mobilization and enhancing value of unused railway assets.

3. **The Headquarter of the Expert Group will be at Rail Bhavan, New Delhi.**

4. **The Expert Group should submit its interim report in two months from the date of constitution of the Committee and the final report by 31.3.2012 with a clear focus on a Roadmap for speedy implementation.**

(Shiv Dan Singh)
Joint Secretary (Gaz)
Railway Board

Copy to:

1. The Prime Minister's Secretariat, New Delhi.
2. The General Managers, All Indian Railways (including Metro & CORE) Construction and Production Units.
3. The Director General, RDSO, Lucknow.
4. The Director General, RSC, Vadodara.
5. PS/MR, ED/MR, EDPG/MR, PS/MSR(M), PS/MSR(B), EDPG/MSR(B).
6. PSOs/Sr.PPSs/PPSs/PSs to CRB, FC, MS, MT, ME, MM, ML, Secretary, DG/RPF, DG/RHS, All Additional Members/Advisers/Executive Directors, ADG/PR, JS(G), JS(E), JS, Director (Tele), Dir(P), DTC(G), DTC(G)II, DIP, DS(G), US(A), US(P), US(E)Spl., US(Protocol), Railway Board.
7. Cash-I, ERB-II, ERB-III, ERB-V, G, G(Pass), G(Acc), Library, Reception, Infra Cell, TG-I, SSE/Telecom, SEE(Electrical), SSE (Works), O&M, Parl. Branches, Railway Board.
8. The Pay & Accounts Officer, Railway Board.
9. The Principal Director of Audit, Northern Railway.
10. Dy. Comptroller & Auditor General of India (Rly.) R.No.224, Rail Bhavan, New Delhi.
11. Commissioner of Railway Safety, 16th Ashok Marg, Lucknow.
12. The Secretary General, FROA & IRPOF, Rail Bhavan, New Delhi.
13. The Secretary General, AIRPFA, Rail Bhavan.
14. The General Secretary, AIRF & NFIR, Rail Bhawan, New Delhi.
15. The General Secretary, IRCA, New Delhi.
16. The Chairman and Members of the Expert Group.
17. Adviser(Infra)/Railway Board and Secretary to the Expert Group.

Annexure II

Terms of Reference and constitution of the working groups

I. TRACK & BRIDGES:

- (a) B.D. Garg CAO/Const
- (b) Mr Avasthi, CE/TMS, NR
- (c) S.P. Singh EDCE(P) - Co-ordinator

ToR

- Present status of track, bridges, tunnels, rail overpasses on Indian Railways in terms of track structure, category of track, speed potential, axle load, route-wise, section-wise, summarised position.
- Need to modernise track/route by way of expansion of network, raising of speed, increasing the axle load, fitness for running of double stack container trains and longer freight trains.
- Approximate cost estimate of modernisation, timeframe and cost benefit analysis of track modernisation framework.
- Examine the organizational design for carrying out modernisation.

II. SIGNALLING:

- (a) Shiv Kumar Chowdhary;
- (b) Mahesh Mangal, Sr ED/RDSO.
- (c) R.C. Adwal/ED/Tele.Dev - Coordinator

ToR

- Present status of electronic signalling at the stations, route-wise, section-wise.
- Need to modernise signalling for improving safety, augmenting capacity and increasing speed of trains.
- Identify specific signalling technology for modernization.
- Estimation of cost and timeframe for modernisation.
- Cost benefit analysis of modernisation of signalling.
- Identify associated requirements for fencing, elimination of level crossing and its impact on reduction in manpower.

III. ROLLING STOCK:

- (a) G.N. Asthana/GM/WCR.
- (b) Ravinder Gupta, EDME Freight/RB;
- (c) Shri P.K.Srivastava, Adv Electrical/RB-Coordinator

ToR

- Present status of coaching and freight rolling stock in terms of class of travel, speed potential for passenger trains and pay load to tare ratio, axle load for freight trains.
- Installed manufacturing capacity for various types of rolling stock.
- Need to upgrade rolling stock keeping in view the requirement to raise speed, improved design and comfort level, provision of modern facilities, etc.
- Identification of technologies for modernisation of rolling stock.
- Local production status and need for import of technologies.
- Estimation of cost and time required for modernisation.
- Preparation of cost benefit analysis.

IV. STATIONS AND TERMINALS:

- (a) Shri Pankaj Jain, Vice Chairman, RLDA
- (b) Shri Ranjan Jain, Adv/Infra, Railway Board
- (c) Shri H.K.Jaggi, Adv/L&A, Railway Board-Co-ordinator

ToR

- Prepare a list of 500 passenger stations on IR for redevelopment, State-wise.
- Divide these stations in 3 categories in terms of size of the stations.
- Identify legal, policy and coordination issues requiring attention in redevelopment of station.
- Identify 50 locations requiring development of multi-modal logistics Parks.
- Estimation of cost and timeframe.
- Prepare cost benefit analysis.
- Work out a broad PPP model for station redevelopment and private freight terminal development.

V. ICT:

- (a) R. B Das, COM/ECOR
- (b) R.C. Adwal/ED(Tele.Dev)/RB
- (c) Ranjan Jain, Adv(Infra.)/RB
- (d) Sobhit Bhatnagar Director(C&I S)-Coordinator

ToR

- Present status and programme to implement various systems.
- Need to build a National Railway ICT platform.
- Implementation plan for SIMRAN, mobile ticketing, Web access on trains and platforms.
- Implementation of RFID for management of freight operation.
- Current status of electronic tendering, electronic payment in freight operation, Freight Operation Information System, Coaching Operation Information System, control charting, time tabling, capacity planning, ICT for safety, Track Management System, Loco Management System, etc.
- Status of accounting reform and plan for implementation of modern accounting system including full computerisation of accounts.
- Status of project management, human resource management, inventory management systems on IR.

VI. INDEGINOUS DEVELOPMENT:

- (a) DG RDSO;
- (b) Director IIT Kanpur;
- (c) Ved Mani Tiwari, Dir/EE(Dev.)
- (d) Sanjiv Kishore/ EDME(Dev)-Coordinator

ToR

- Present status of import and export of equipment, plants and machinery in Railways.
- Present status of R&D in product development in Railways.
- Identification of the need to enhance role of R&D in certain specific areas.
- Identification of products requiring R&D.
- Assess export potential of railway equipment & rolling stock, track & signalling technology, etc.
- Present status of railway interface with industry, Universities and research Institutes.

VII. PROJECT REVIEW:

- (a) Sanjay Mukherjee, Adv(FX);
- (b) Pradeep Bhatnagar, AM(Traffic)
- (c) Chandra Prakash, Adv(Projects)-Coordinator

ToR

- Review of existing and proposed projects from the standpoint of prioritisation to create capacity, financial viability and other tangible benefits.

- Prepare a status of projects in terms of major cost over-run, time over-run and difficulty in delivery.
- Recommend organizational design to speed up the project implementation.

VIII. PPP:

- (a) Mr Kanoria/FICCI;
- (b) Representative of CII.
- (c) Cherian Thomas, COO, IDFC Foundation
- (d) Satish Mandhana, President, IDFC Private Equity Company Pvt. Limited
- (e) Amrit Pandurangi, Sr.Director, Delloite;
- (f) Charanjit Banerjee/DG/CII
- (g) S.K. Mishra, ED/T/PPP-Coordinator

ToR

- Review and recommend actionable PPP models for Railways in various areas to attract investment for win-win partnership.
- Understand and evaluate present approach and suggest solutions to un-lock bottlenecks.
- Outline lessons learned from other infrastructure sectors and related projects in India and abroad to attract latest technology and investment.

IX. LAND:

Shri H.K. Jaggi, Adv/L&A-Coordinator

ToR

- Present total stock of surplus railway land and air space available for commercial use and the part which is available in the station area.
- Details of parcels of surplus land available in urban and semi-urban areas, location-wise.

X. PASSENGER AMENITIES:

Shri M.K.Reddy, EDPM-Coordinator

ToR

- Suggest measures for improvement of comfort, hygiene, cleanliness, catering, reservations and introduction of other modern amenities.

XI. ORGANIZATIONAL REFORM AND DESIGN:

Shri S.K.Mishra, ED/Traffic/PPP-Coordinator

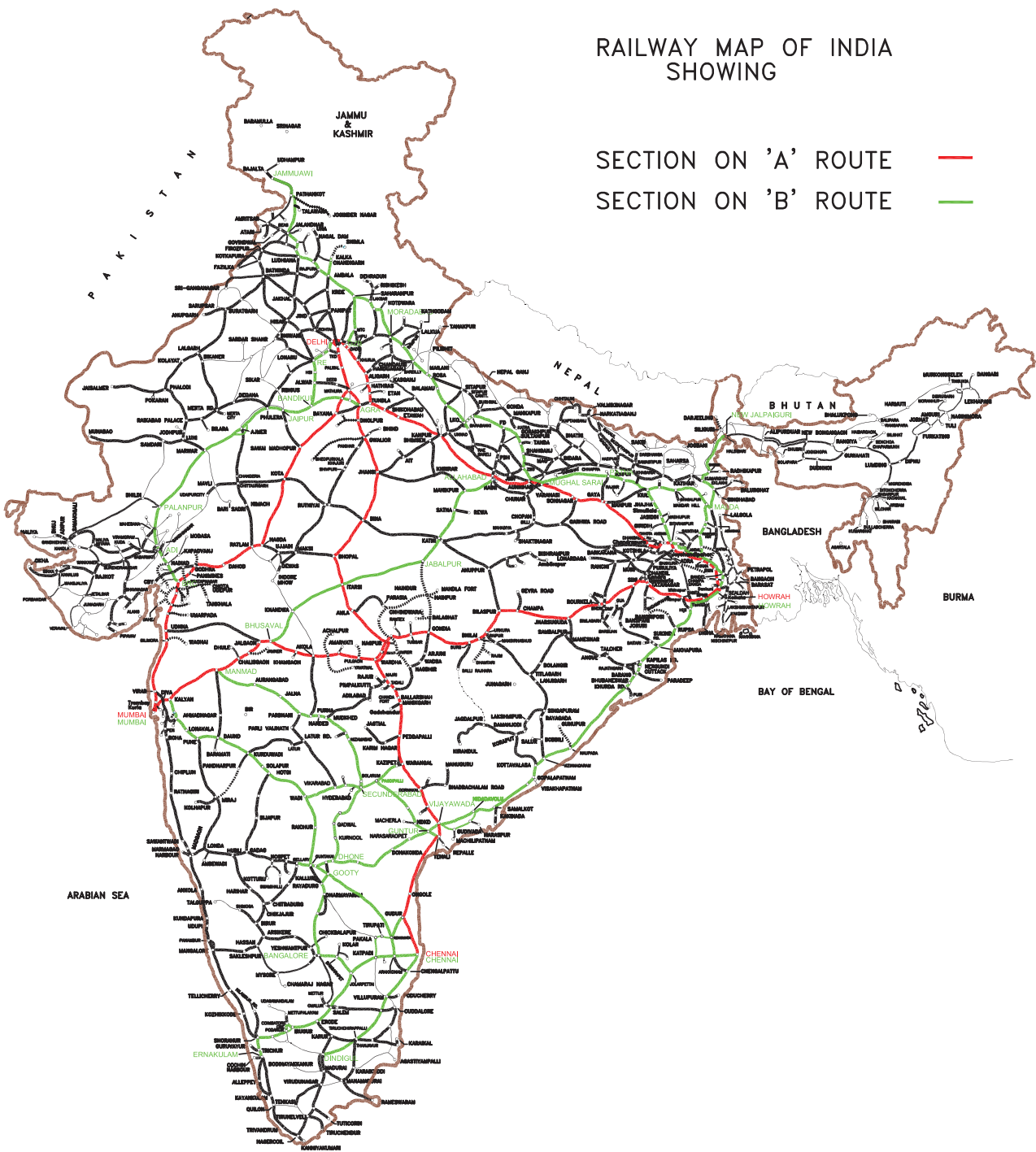
ToR

- Review of past reports and highlight of their recommendations

Annexure III: Routes A and B

Section-wise route kms for routes A & B					
Route A			Route B		
S. No.	Section	Kms	S. No.	Section	Kms
1	Mumbai-Nagpur-Howrah	1967.10	1	Jammu-Moradabad-Patna-Kolkata	2334.00
2	Delhi-Mumbai	1434.00	2	Chennai-Ernakulam	710.00
3	Delhi-Chennai	2055.00	3	Mumbai-Chennai	1151.00
4	Delhi-Howrah	1404.00	4	Chennai-Dindigul	435.00
			5	Bandikui-Agra Fort	150.00
			6	Secunderabad-Manmad	616.00
			7	Secunderabad-Dhone	297.00
			8	Chennai-Bangalore	407.00
			9	Delhi-Jaipur-Palanpur-Ahmedabad-Baroda	1021.00
			10	Kharagpur-Vijayawada	1101.00
			11	Howrah-Malda-New Jalpaiguri	289.00
			13	Allahabad - Jabalpur- Bhusaval	913.00
			14	Delhi-Ambala-Kalka	264.00
			15	Ambala-Jalandhar	166.00
			16	Gudur-Tirupai-Katpadi	413.00
			17	Kazipet-Secunderabad-Wadi	317.00
			18	Guntur-Nandyal-Guntakal-Bellary	589.00
			19	Delhi-Ambala-Kalka	265.00
			20	Ghaziabad-Saharanpur	160.00
				Nadikude-Pagadipalli	149.00
	Total	6860.10		Total	11365.00

Annexure III: Routes A and B



Annexure IV: Rolling Stock

S. No.	Item	Total Cost (Rs. In Crores)	*Included in 12th Plan Estimates	Balance to be Funded	Advantages/Need
1.	Induction of 160/200 kmph speed potential LHB coaches	6,000	4,000	2,000	Superior crash-worthiness better performance, and higher speed potential.
2.	Upgraded suburban coaches (EMU, MEMU and DMU)	12,000	8,000	4,000	Stainless steel bodies and 3 phase technology would result in superior ride index under super-crush dense loads.
3.	Train sets for intercity travel with modern aluminium body coaches with distributed power system	5,000	Nil	5,000	High speed travel up to 200 kmph to be introduced on select inter-city corridors
4	Modern maintenance facilities for train sets	2,500	Nil	2,500	Additional 5 such facilities
5.	Modern high pay to tare ratio, track friendly 25t axle load wagons for 100kmph operation	25,000	16,000	9,000	Higher freight carrying capacity would be achieved, based on incremental costs – in tandem with investment in rails and signalling systems
6.	Electric locomotives (9000 & 12000 HP)	6,000	6,000	Nil	
7.	High Horse power diesel Locomotive (5500 HP) from DLW	4,500	3,300	1,200	Indigenous upgradation over imported 4000 hp design. Minimise double heading and to give a 11000 hp twin loco.

Annexure IV: Rolling Stock

8.	Introduction of green toilets	6,000	2,500	3,500	No discharge on tracks – lower corrosion of rails and better hygiene.
9.	Traction Development for improvement in fuel efficiency, emission and reliability	2,800	Nil	2,800	Over 5 years. Better traction and fuel efficiency, predictive maintenance benefits and higher speed capabilities could result in aggregate savings of Rs. 8000 crores over 10 years.
10.	Heavy haul freight bogies (4000 bogies)	471	471	Nil	Reduced wheel and rail wear and lower maintenance. Would also result in better wagon availability.
11.	Improved coach interiors (1000 coaches)	500	500	Nil	Better passenger services
12.	OMRS (65 nos.)	250	250	Nil	Safer operations and less traffic disruption in case of en-route detachment.
13.	EOTT (4000 sets)	350	350	Nil	Extra wagon for same train length. Avoids detention of rake while shunting.
14.	IT for maintenance of rolling stock				Better asset availability and reliability. More efficient monitoring and control.
	- Pilots	200	200	Nil	
	- Roll out	1000	1000	Nil	
	Total	72,571	42,571	30,000	

* Committee has taken these figures from the report of Railway Sector sub-group of XIIth Plan. The XIIth Plan is yet to be finalized and approved.

Annexure V: PPP Initiatives

S. No.	Project	Total Cost (Rs. In Crores)	Time-frame	Investment expected in next 5 years (through PPP)	Cost to Government
1.	High speed corridor- Mumbai-Ahmedabad	60,000	10 years	20,000	Viability Gap-upto 20% of cost
2.	Elevated Rail corridor in Mumbai suburban.	20,000	5 years	20,000	Viability Gap-upto 20% of cost
3.	Redevelopment of stations and Logistic Parks*.				
4	Wagon leasing, Private freight terminals and other freight schemes.	5,000	5 years	5,000	
5.	Dedicated freight corridors*.				
6.	Loco and coach manufacturing units.	6,000	5-6 years	5,000	Equity share of about Rs 300 crores and assured off-take of products for 10 years
7.	(a) Renewable energy projects (solar, wind, etc.)	1,000	5 years	1,000	Assured off-take
	(b) Energy saving projects.	1,000		1,000	
	(c) Captive power generation.	4,000		4,000	
	Total	97,000		56,000	

*Investment in these projects has been covered in the respective initiatives listed separately in the modernization plan.

Annexure VI: ‘Priority projects’

S. No.	Item	Rs. in crores
1.	101 projects in advanced stage of completion	8,105
2.	Projects already sanctioned: a) 89 doubling projects (Rs. 16,222 crores) b) 15 new line/gauge conversion projects (Rs. 4,000 crores)	20,222
3.	Projects to be sanctioned 15 new line/doubling projects	18,000
4	Electrification	7,500
	Total	53,827

Annexure VII: ICT Improvements

S. No.	Item	Total Cost (Rs. In Crores)	*Included in 12th Plan Estimates	Balance to be Funded	Time Frame (Yrs)	Benefits
1.	Internet access at 58 'A1' class stations and 284 'A' class railway stations	65	Nil	65	1	Improved passenger experience
2.	Unified ICT platform for 6000 railway stations	500	Nil	500	3	Communication services – voice, data & video services for all administrative/ operational requirements
3. (a)	RTIS based on SIMRAN project	150	150	Nil	2	Tracking of trains, locomotives and cargo
3. (b)	RFID tracking system for wagons, coaches and locomotives	600	100	500	4	Tracking of wagons and cargo to improve wagon utilization and availability by 10%
4.	Mobile Ticketing (unreserved)	-	-	-	1	Reserved ticketing already launched
	Total	1,315	250	1,065		

* Committee has taken these figures from the report of Railway Sector sub-group of XIIth Plan. The XIIth Plan is yet to be finalized and approved.

Annexure VIII: Indigenous Developments

S. No.	Item	Total Cost (Rs. In Crores)	*Included in 12th Plan Estimates	Balance to be Funded	Benefits
1.	Wagon Prototyping Centers	200	200	Nil	Fast development of new designs of wagons. The first one is being set up at Kharagpur
2.	Centres of excellence in Mechatronics	50	50	Nil	Capability to handle emerging products effectively. Two being set up in RCF and DMW
3.	Green Toilet Centre	14	14	Nil	Prototyping and development of green toilet sub-systems, being set up in Nagpur workshop
4.	Upgrades in Indigenous manufacture	200	Nil	200	State of Art Foundry facilities for higher axle load bogies
	Total	464	264	200	

* Committee has taken these figures from the report of Railway Sector sub-group of XIIth Plan. The XIIth Plan is yet to be finalized and approved.

Annexure IX: Safety related investments

S. No.	Item	No. of units	Amount Required (Rs. In Crores)	Comments
1.	Mechanized maintenance of track with latest track machines	2305 machines	5000	<ul style="list-style-type: none"> Targeted by 2020. 618 machines currently.
2.	Improved welding technology		1200	<ul style="list-style-type: none"> Total no. of welds on IR: 48,50,023. No. of Rail failure/Weld failure: 5353 (2008-09), 6508 (2009-10) , 6632 (2010-11)
3.	Elimination of unmanned level crossings by manning, closure, merger, construction of overbridges and underpasses	14896	5000	<ul style="list-style-type: none"> Targeted by 2015.
4.	Vehicle borne digitized and recordable ultrasonic flaw detectors to cover the entire railway system	30 machines	900	
5.	Upgradation/setting up of training facilities for track , bridge and track machine staff	1 per zone	160	
6.	Installation of wheel impact load detectors(WILD)	260 units	200	
7.	Instrumentation of Bridges	160	80	
8.	Communication & other gadgets to track & bridge staff for detection of rail fractures at night		50	

Annexure IX: Safety related investments

9.	Upgradation/setting up of Non-Destructive Mobile Bridge Testing laboratories for each zone		24	
10.	Anti Collision Device (ACD)			<ul style="list-style-type: none"> Sanctioned in 8 zones (8537 RKMs)
11.	Train Protection Warning System (TPWS)		15000	<ul style="list-style-type: none"> Sanctioned in 5 zones (3330 RKMs). Proposed to be provided at balance 1840 RKm on Automatic Signalling section , 5024 km on 'A' Route and 10800 RKm on 'B' Route
12.	Radio networking for ACD/ TCAS and information for drivers in the cab on low density routes	34000 RKm	1750	
13.	Management Information System and Maintenance Monitoring system using Enterprise Resource Planning (ERP)		100	
14.	Upgradation of Training Institutes (IRISET & 10 STTC)		110	
15.	Modernization and renovation of Railway workshops	20	4000	
16.	Upgradation of Coaching depots		2160	<ul style="list-style-type: none"> Wheel care facilities, vision based stations for wheel profile measurement, brake block ,broken spring detection, integrated and enroute examination facilities for elimination of human interface

Annexure IX: Safety related investments

17.	Upgradation of Disaster Management facilities		1730	• Provision of high speed Self-Propelled Accident Relief Trains and Medical Vans, road cum rail vehicles for accident relief , 175 tonnes cranes, setting up of Disaster Management and other Training Centers
18.	Self propelled car and mechanized maintenance for Traction Distribution assets		372	
19.	Up gradation of Training Institutes with modern facilities		2000	
	Total		39,836	

Annexure X: Investments and Resource mobilization through PPPs

(Next 10 years)

Sources of Funds – PPPs		
S. No.	Item	Rs. in crores
Investments through PPPs		
1.	High speed corridor (Mumbai-Ahmedabad)	60,000
2.	Elevated Rail corridor in Mumbai suburban	20,000
3.	Redevelopment of stations	1,10,000
4.	Dedicated freight corridors	134,000
5.	Logistics Parks	17,000
6.	Wagon leasing and other freight schemes	5,000
7.	Loco and coach manufacturing units	6,000
8.	Captive power generation; Renewable energy & other energy saving projects;	6,000
9.	Port connectivity projects	5,000
Resource mobilization through PPPs		
10.	Land and airspace	50,000
	Total	413,000

The investment through PPP is spread over XIIth and XIIIth plan period. Investment during XIIth plan is Rs 229,000 crores and during XIIIth plans Rs 164,000 crores. Rs. 20,000 crore of revenue though monetization of land and airspace is included in the internal generation. Hence, only Rs. 393,000 crores from PPP is shown as resource available for modernization.

