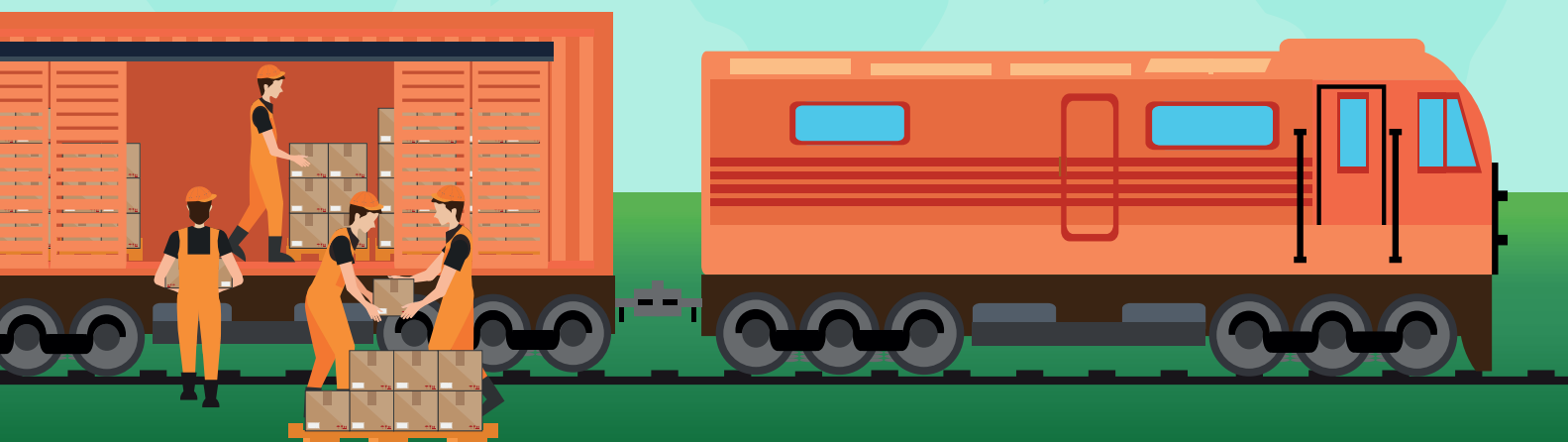


MOVING TOWARDS A LOW-CARBON TRANSPORT FUTURE

Increasing **Rail Share** in Freight Transport in India

Freight Performance of Indian Railways



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Freight Performance of Indian Railways



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FREIGHT PERFORMANCE OF INDIAN RAILWAYS

The Indian Railways (IR) is a mammoth organization. The size of this organization can be gauged by the number of people it employs (13 lakh direct employment), the number of passengers carried (about 23 million in a day), and the volume of freight traffic carried (about 3 million tonnes per day). However, these are also the areas of concern for IR's growth right now. Massive fund is required to pay its employees – retired and present, and the growth rates for both passenger traffic and freight traffic are declining. The financial position of rising expenditure and lower growth in revenues makes it difficult for the IR to manage its capacity expansion initiatives. 'The operating ratio, which should be between 80–85%',¹ was reported at 96.5% in 2016-17 (Annual Statistical Statement, 2016-17).

Decoupling of Rail Traffic and GDP growth rates

The contribution of transport sectors in the growth of an economy is undisputed. It is seen that its contribution is higher than the proportion of the expenditure being used to improve and maintain the transport sector.² The Indian Railways has always played an important role in the economy's growth rate. However, there has been rising dominance of the road sector in passenger as well as freight transportation. This is largely on account of increased investment in improving road infrastructure (Figure 1) as well as the declining cost of road transportation. Economic Survey, 2017-18 highlighted this major constraint of increasing competitiveness (tariff) from other modes of transport, mainly road that has resulted in IR's slowdown in freight traffic³. Other reasons cited by various committee reports as well as previous economic surveys include severe capacity constraints on trunk routes, non-flexible policies, limited financial resources to maintain or develop

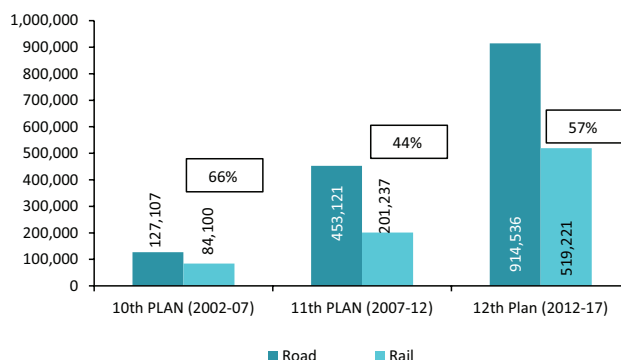


Figure 1: Investment in road and rail infrastructure under the last three Five Year Plans (Rs crore)

Note: Figures in box indicate rail investment as a percentage of road investment

Source: Five Year Plan Documents and NTDP

massive infrastructure, and the lack of commercial and marketing initiatives to attract traffic. The perception of industry about Indian Railways has always been that of a transporter with a 'take it or leave it' approach. Railways, on the other hand, witnessed a slowdown in investment in capacity augmentation and consistently higher tariff rates to subsidize the passenger movement.

Further, since the effect of investment in physical infrastructure comes with a lag on account of gestation period, the decline in railway freight traffic is expected to extend in the coming years as well, at least till the two on-going Dedicated Freight Corridor (DFC) projects are fully functional and other capacity augmentation projects are realized.

TERI analyses the growth in IR's traffic during last three five year plan vis-à-vis economic growth (in terms of gross domestic product [GDP]).

Without doubt, the Tenth Five Year Plan Period (2002-07) was one of the most successful years for Indian Railways in terms of transportation output – passenger km for passenger movement and tonne km for freight movement. Indian Railways exceeded most of the

¹http://planningcommission.nic.in/plans/planrel/12appdrft/approach_12plan.pdf

²<http://www.oecd.org/derec/adb/39066399.pdf>

³https://mofapp.nic.in/economicssurvey/economicssurvey/pdf/120-150_Chapter_08_Economic_Survey_2017-18.pdf



targets set for the Tenth Five Year Plan ⁴. Such outcome was achieved by the Railway Board by adopting supply side strategy of running faster, longer and heavier trains; and demand side strategy of dynamic and differential pricing (Mehrotra, 2009).

For the freight movement, the decision was taken to increase the load ability of wagons on select routes by 15% during mid-2000. The tariff rates were also tweaked based on the market competition and the kind of services rendered by IR for certain commodities also improved. As a result, significant improvement in loading was reported for commodities, such as coal, iron ore, cement, and containers.

The transportation output growth during the Eleventh Five Year Plan tapered, where the achievement was lower than the target. For instance, the revised terminal year target for passenger km was set at 1,100 billion; however, the actual achievement was 1,062 billion, a shortfall of about 4%. In terms of freight transportation, IR reported 640 billion tonne km (btkm) during 2011-12 as compared to the revised target of 674 btkm, a shortfall of 5% ⁵.

Notably, the rate of growth of the gross domestic product (GDP) remained on a higher side throughout the three plan periods, indicating a de-coupling of GDP and IR's traffic growth. There could be various factors leading to the rail traffic decline, even though GDP remained on the higher side, including infrastructural constraints, inability to cater to changing customer needs, etc. (these have been elaborated in later sections).

Table 1: Growth rate of NTKM, PKM and GDP during the last three Five Year Plan periods (CAGR %)

	CAGR_NTKM	CAGR_PKM	CAGR_GDP
10th Plan	8.0%	7.8%	8.6%
11th Plan	6.4%	8.0%	7.3%
12th Plan	-1.2%	1.3%	7.3%

Source: Indian Railways and Reserve Bank of India⁶

Finances of the Indian Railways

The Indian Railways is dependent on a number of sources for funding their day-to-day requirements as

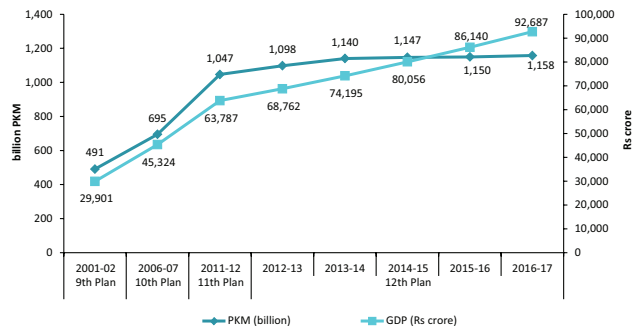
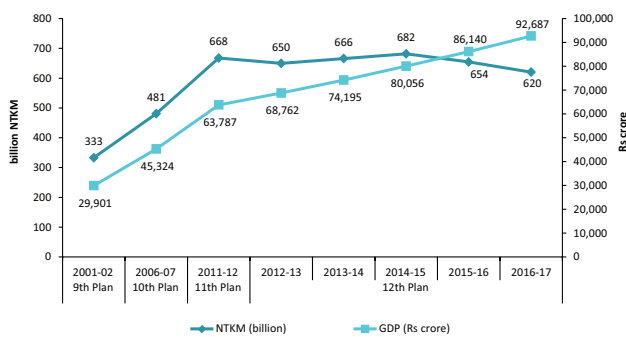


Figure 2: Growth of IR's passenger and freight traffic and India's GDP
Source: Indian Railways

The rate of growth of pkm and tkm witnessed rapid decline during the Twelfth Plan period (Table 1). This compared to relatively higher rate of growth during the previous two plan periods (Tenth and Eleventh). The Eleventh Plan witnessed economic slowdown due to global financial crisis and despite this, the tkm and pkm grew at a healthy rate.

well as infrastructure augmentation. There are three key sources—budgetary allocation, extra budgetary resources like market borrowing, and internal resource generation mainly through traffic income.

A trend analysis of the sources of revenue for the Indian Railways is as follows:

⁴ <http://www.indianrailways.gov.in/railwayboard/uploads/directorate/infra/downloads/ReportoftheWorkingGroupfortheXIfiveyearPlan.pdf>

⁵ http://planningcommission.gov.in/plans/planrel/fiveyr/12th/pdf/12fyp_vol2.pdf

⁶ Please note that comparison on the basis of growth rates (CAGR over the five year plans) overcomes the data challenge related to the change in base year from 2004-05 to 2011-12



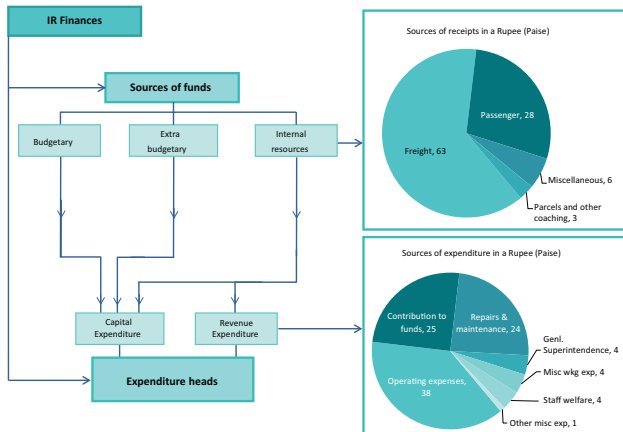


Figure 3: Sources of revenue and expenditure heads of Indian Railways
 Note: Revenue and expenditure shares are for 2016-17; Source: Indian Railways

- There is a rapidly increasing dependence on extra budgetary resources like market borrowing due to lower share of internal resources in total fund required for infrastructure expansion.

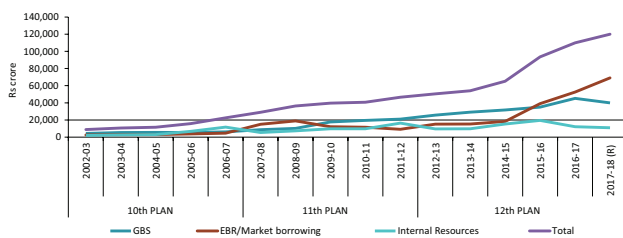


Figure 4: IR's expenditure sources over the last three Five Year Plans
 Source: Budget documents, Indian Railway

- The spike in the internal resources during 2014-15 in Figure 4 is on account of increase in passenger and freight tariff rates in June 2014.
- Budgetary support has also consistently increased in the last 5–6 years.

Traffic Earnings of Indian Railways

Despite decline in passenger traffic growth during Twelfth Plan, growth in passenger earnings remained on a positive side. In fact, it grew more than the Tenth and Eleventh Five Year Plans. This is mainly due to the significant revision in tariff rates during 2014-15. As a government-managed service provider, Indian Railways should devise ways to stall the declining passenger traffic and increase passenger traffic in the longer run,

instead of focussing on the rising passenger earnings.

Table 2: Growth rate of freight and passenger earnings during the last three Five Year Plan period (CAGR %)

	CAGR_ Freight Earnings	CAGR_ Passenger Earnings	CAGR_ Total Traffic Earnings	CAGR_ GDP
10th Plan	12.0%	8.2%	10.8%	8.6%
11th Plan	10.0%	9.3%	9.8%	7.3%
12th Plan	5.2%	10.3%	6.6%	7.3%

Source: Indian Railways

Operating ratio

As mentioned in the opening remarks to this chapter, Indian Railways is facing stiff challenge of high operating ratio. Operating ratio is defined as the amount spent to earn every Rs 100. IR's operating ratio has consistently remained above 90 since 2008-09.

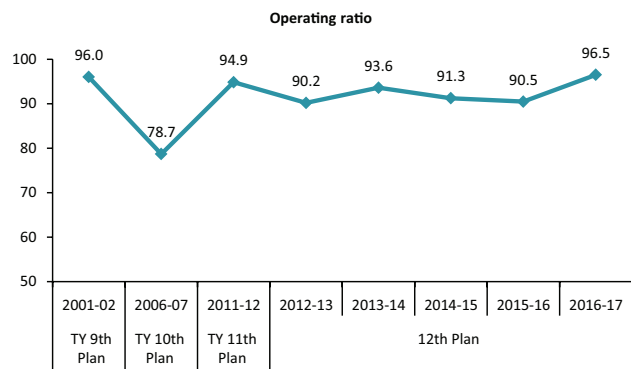


Figure 5: IR's operating ratio trend
 Source: Indian Railways

Plan period – Targets and Achievements

A look at the targets set during the Five Year Plans and the actual achievements for freight and passenger traffic indicates that performance under the Tenth Plan was higher as compared to the following two plans. In fact, performance under the Twelfth Plan has been extremely poor with under-achievement of 42% in freight traffic and 23% in passenger traffic (see Table 3).



Five Year Plan	Freight Traffic Loading (billion NTKM)		Achievement (%)	Passenger Traffic (billion PKM)		Achievement (%)
	Target	Actual		Target	Actual	
10th Plan	396	481	21.5%	593	695	17.2%
11th Plan	642	668	4.0%	924	1,047	13.3%
12th Plan	1,070	620	-42.1%	1,509	1,158	-23.3%

Note: Target for the terminal year of Five Year Plans
Source: Indian Railways and NTDP

Focus on infrastructure development

The achievements with regard to development of key infrastructure by the Indian Railways during the last three five year plans have been mixed. Construction of new lines surpassed the target only during the Eleventh Plan, gauge conversion surpassed the target only during Tenth Plan, and doubling surpassed the target only during Eleventh Plan. Electrification targets were surpassed during all the last three five year plans. Notably, the Twelfth Plan period witnessed severe shortfall in targets set for new line construction, gauge conversion, and doubling. One of the key reasons for the consistent under achievement in these segments has been *slow growth in fund allocation for these categories*⁷. It is observed that investment for infrastructure development increased significantly during the Twelfth Plan period, the result for which is expected to be realized in the coming years on account of high gestation period of these projects⁸.

Construction of New Lines

With 10% over achievement in constructing new lines, the target for the Twelfth Plan was set ambitiously high. IR has, however, been unable to achieve the targets under the last Five Year Plan. Investment witnessed a rapid jump since 2015, the result of which is expected in the next 4–5 years. The compound annual growth rate (CAGR) of investment related to new lines for the Tenth, Eleventh, and Twelfth plans are 27%, -4%, and 12%, respectively.

Gauge conversion

Gauge conversion has missed its target during the last two Five Year Plans. The investment allocated towards gauge conversion has also fluctuated over the years. The CAGR of investment related to gauge conversion for the Tenth, Eleventh and Twelfth plans are 27%, -4%, and 12%, respectively. There are about 3,500 route km of metre

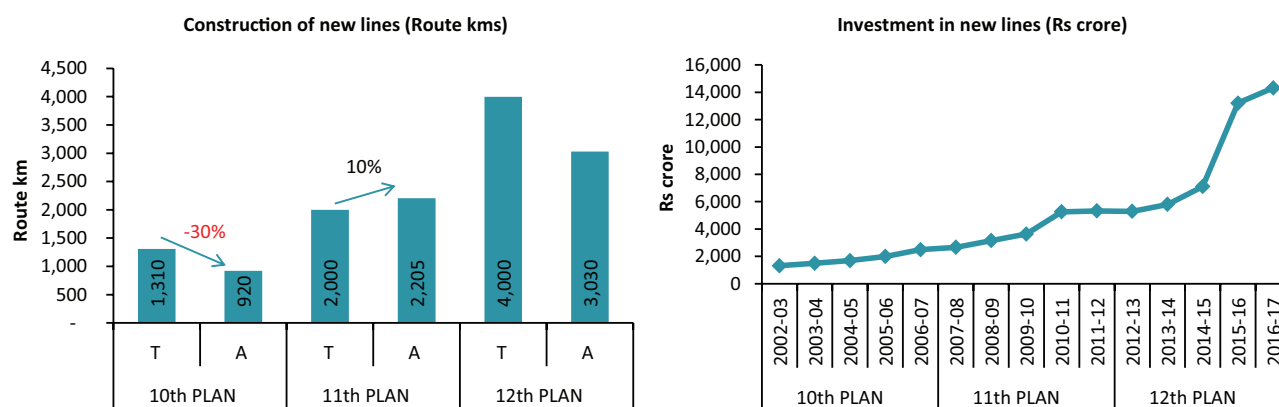


Figure 6: Construction and investment in New Lines (route km, Rs crore) T: Target; A: Achievement
 Source: Planning Commission, Standing Committee report on Railways (2014-15), Working Group for the XI Five Year Plan (2006-07); and IR Year Books of respective years.

⁷http://niti.gov.in/writereaddata/files/document_publication/Appraisal%20Document%20Five%20Year%20Plan%202012%20-%202017-Final%20%281%29.pdf (assessed on July 29, 2018)

⁸Note: Figures related to investment in various infrastructure development are given in Appendix 1



gauge and 2,200 route km of narrow gauge in IR's rail network⁹ which would eventually be converted to broad gauge in the future. The priority for conversion of gauge is dependent upon traffic growth on a particular stretch.

Doubling

Doubling work has been given emphasis since 2015, with quantum jump in investment. During the Tenth, Eleventh, and Twelfth Plan periods, CAGR in investment were reported at 20%, 8% and 39% respectively. Consistently higher investment level for doubling works is likely to ease the congestion situation on the IR network.

Electrification

Electrification remains a major area of improvement in

IR's infrastructure development plan. IR plans to electrify 90% of the total railway routes in the years to come . As seen in other projects, investment towards electrification has witnessed significant boost in the last three years. The CAGR of investment related to electrification for the Tenth, Eleventh, and Twelfth plans are -1%, 16%, and 31%, respectively.

Focus on Freight Traffic

Over the last few decades, not only has the volume of freight transport increased exponentially, given a rapidly growing economy, there have also been changes in the way the movement of goods take place. From carrying about 62% of the share of freight transport in the country in 1990-91, the share of railways has gone down to about 27% by 2014-15. As a result of the

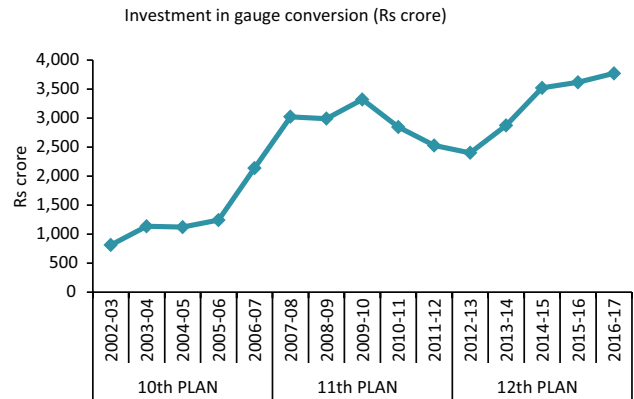
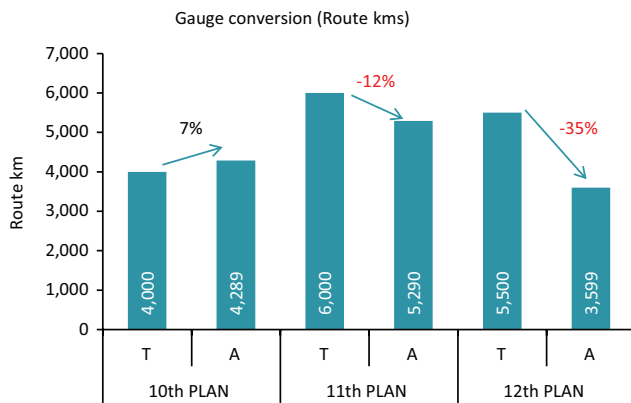


Figure 7: Construction work and investment related to Gauge Conversion (route km, Rs crore)
Source: Year Books, Indian Railways

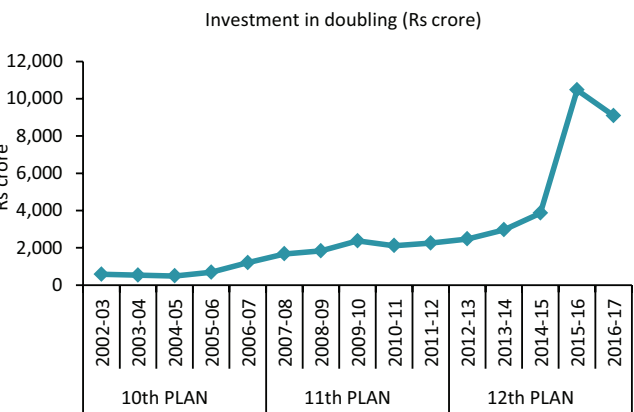
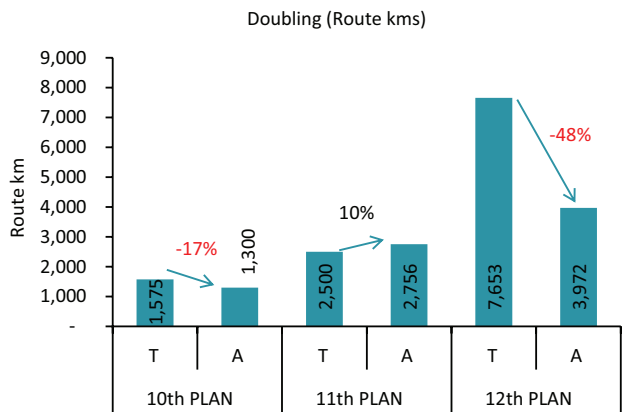


Figure 8: Construction and investment related to Doubling work (route km, Rs crore)
Source: Year Books, Indian Railways

⁹http://www.indianrailways.gov.in/railwayboard/uploads/directorate/stat_econ/IRSP_2016-17/Facts_Figure/17.pdf



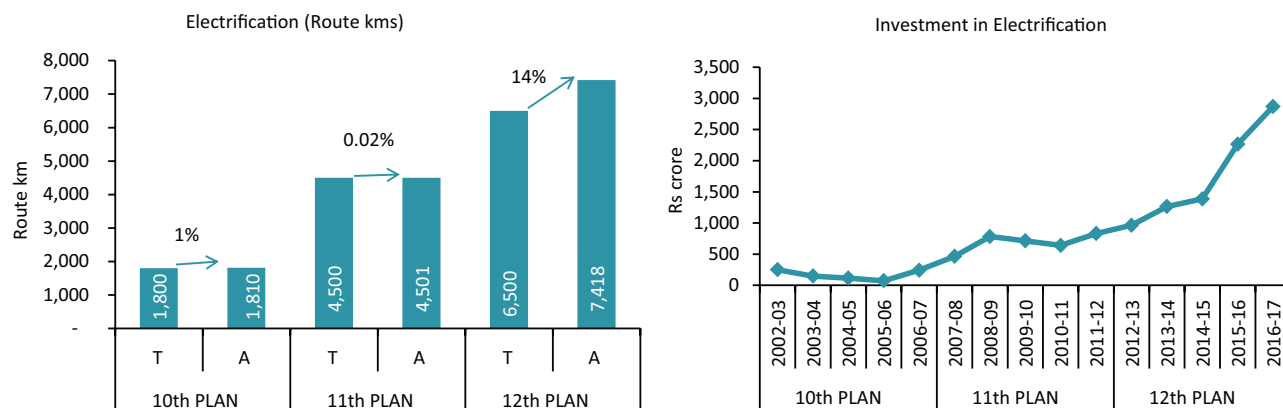


Figure 9: Work and investment related to Electrification (route km, Rs crore) T: Target; A: Achievement
 Source: Planning Commission, Standing Committee report on Railways (2014-15), Working Group for the XI Five Year Plan (2006-07); and Year Books, Indian Railways

pertinent challenges faced by the Indian Railways and the benefits of alternate mode of transportation—the roadways, the share of IR in total freight transportation has been declining continuously. The ever expanding road networks, cost competitiveness over railways, and door-to-door service have worked in favour of the high-carbon mode of transportation.

This trend not only has implications on the economic growth trajectory of country, but also on the levels of energy and emissions from the sector. Being the most environmentally benign mode of land transport, it is critical for the country to first retain and then to increase the share of railways. This has also been quantified under the Government of India’s obligations under the Nationally Determined Contributions (NDCs). One of the key strategies to meet the NDC targets, ratified by India in December 2015, is to increase the share of railways in total land-based freight transportation from 36% in 2012-13 to 45% by 2030. This implies that there is a huge task before the Indian Railways to first restrict the declining traffic growth and then to substantially increase the volume it transports vis-à-vis the road sector by 2030. Of course, a lot of hope has been pinned on to the upcoming DFCs. However, the challenges related to the existing system will continue to trouble IR till the dedicated freight corridors (DFCs) are operational, which need to be resolved at the earliest. There are other factors, such as marketing and tariff strategies, inter-modal operability, availability of allied infrastructure like terminals and warehouses, etc., as well that need to be reviewed for the DFCs to be successful, which is beyond the scope of this study.

Committees to Determine the Cause of Market Share Decline

The Indian Railways has conducted studies from time to time to examine the causes of decline in its market share and to take remedial action for arresting the downward trend.

There have been Railway Convention Committees and Fare and Tariff Fixation/Enquiry Committees along with reports of Expert Groups on Capital Structure, Restructuring as well as Modernization of Indian Railways. Reports of Railway Reforms Committees and White Papers on Indian Railways are also available. More recent reports on Indian Railways have been highlighted in Figure 10; these discuss in detail the challenges faced by Indian Railways as well as the steps that should be undertaken to overcome such challenges.

Declining Rail Share in Freight Transportation: The Ministry of Railways commissioned RITES Ltd to undertake a study on ‘Decline in Railways’ Share of Total Land Traffic’, which was submitted in 1997. The primary objective of the study was to understand the reasons behind the declining share of railways in total freight movement and suggest measures to reverse the declining share. One of the key conclusions of the study was that Indian Railways was unable to carry ‘traffic on demand’, which resulted in movement of such commodities via roadways. The study also talked about improving terminal infrastructure and operational efficiency, and developing a healthy relationship with the truck operators to augment multi-modal or smooth transit facilities.



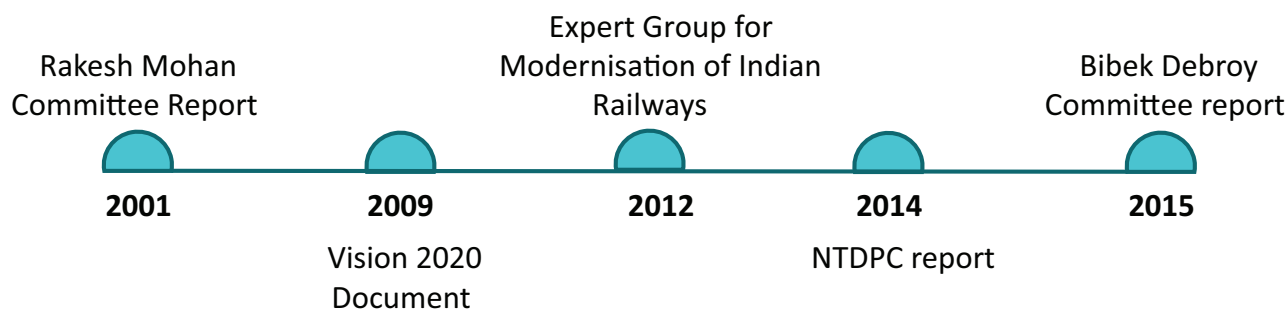


Figure 10: Timeline of key committee reports related to Indian Railways
Source: Compiled by TERI

In addition, factors such as inadequate rail infrastructure, changing patterns of commodity wise demand for transport, increasing rail transport costs, lack of transit time guarantee, etc., have all resulted in a decline in the IR's share in freight transportation. A shortcoming on behalf of the railways in meeting changing customer needs and rising up to meeting the competition from other transport modes like roadways and other operational and organizational issues of the Railways have been cited in the above mentioned committee reports as major impediments in incentivizing movement of freight traffic on the Railways. These together have led to a perception issue for the railways, for which customers with limited demands have often shied away from using the Railways.

The National Transport Policy Committee, NTPC, 1980, recommended a market share of over 70% for railways in freight transport primarily on account of energy saving potential as compared to roadways. NTDP (2014) again endorsed a primary role for railways in freight transport and recommended a massive investment in capacity enhancement. It also spoke about the low fare-freight ratio (indicating cross subsidization of passenger segment by charging higher tariff rates for freight) for Indian Railways as compared to some foreign rail systems like China and France¹¹. While these documents and reports have made useful suggestions on the possible measures that would help the Railways get back some of its shares, there is no dedicated white paper or report which focusses on the specific measures that would help the Railways in aggressively increasing its shares in overall national freight mobility.

While there has been a continuous effort by the Railways to retain, and further increase its share in freight transport by various kinds of policy measures, there is lack of focused integrated view towards meeting this objective. Certain key bulk commodities, such as coal, cement, fertilizers, iron ore, etc., still remain the mainstay of the Indian Railways – while the national freight commodity basket has been undergoing a significant amount of change over the last few years. The much more fragmented, yet flexible, road-based freight transport sector has been much more responsive to such changing trends in traffic types and volumes and has captured most of these new and increasing demands.

The report of the Committee for Mobilization of Resources for Major Railway Projects and Restructuring of Railway Ministry and Railway Board (2015), chaired by Bibek Debroy, has aptly put the issue faced by Indian Railways as 'a wide gap between the supply side improvements and the demand side expectations'¹².

"Railway is on the path of gradual recovery but it still has to be kept in the ICU as it needs to be strong enough." – Mr Suresh Prabhu, Former Minister, Ministry of Railways (July 2017)

"If I had not increased rail fare, believe me, the Indian Railways would have come to a grinding halt. It was headed for the ICU, and I have pulled it out." – Mr Dinesh Trivedi, Former Minister, Ministry of Railways (March 2012) (The Minister had to resign and fare hike was partially rolled back.)

¹¹ http://planningcommission.nic.in/sectors/NTDPC/volume3_p1/railways_v3_p1.pdf (Page 49 of 124, assessed on August 18, 2018)

¹² http://www.indianrailways.gov.in/railwayboard/uploads/directorate/HLSRC/FINAL_FILE_Final.pdf (accessed on August 14, 2018)



Report of the Committee for Mobilization of Resources for Major Railway Projects and Restructuring of Railway Ministry and Railway Board

The Ministry of Railways constituted a committee under the chairmanship of Mr Bibek Debroy in 2014. As the name suggests, the key objective of the committee was to make recommendations related to mobilization of resources for various railway projects as well as restructuring of the Railway Board. The committee submitted its final report to the Ministry of Railways in June 2015.

Some of the key recommendations of the committee are as follows:

- Railway Board to function like Corporate Board for Indian Railways
- Re-organize Indian Railways into two groups – first one looking into Track and Infrastructure, and the other looking into Operations of trains
- Empowerment of General Managers and decentralization of powers to Divisional Railway Managers
- Zonal construction organizations to be brought under one or more Public Sector Undertakings
- Private participation in train operation and developing infrastructure
- Recommendations related to freight marketing schemes/policies like Container Train Operator (CTO), Special Freight Train Operator (SFTO), Automobile Freight Train Operator (AFTO), Liberalized Wagon Investment Scheme (LWIS) and Wagon Leasing Scheme (WLS) are as follows:
 - Merging of all the freight marketing schemes
 - Increase the tenure to match the life of wagons (approx. 40 years)
 - Liberalizing ownership of general purpose wagons
 - Opening of railway god sheds for private investment and use
 - Single window clearance for development of ICDs and PFTs
- Lateral inflow of talent from outside in technical and non-technical departments
- Establish a responsive and transparent accounting and costing system
- Set-up a Railway Regulatory Authority of India
- Discontinue in phases, separate Rail Budget
- Subsidies to be borne by Union Government and passenger concessions by respective Ministries
- Separation of off-line activities such as medical, schools and security

Key Challenges faced by IR

Based on the interactions with the industry stakeholders as well as reports submitted by various committees mentioned earlier, broad challenges or impediments to faster growth of freight traffic moved by rail have been listed below. These have been discussed in detail in respective commodity-specific reports.

Infrastructural constraints: Delay in provision

of adequate infrastructure and sharing of lines by passenger and freight trains have resulted in significant shift of traffic from rail to road. IR's line capacity, terminal infrastructure, and rolling stock asset have not grown as per the demand of the logistics sector. TERI analyzes these impediments below.

- Line capacity: As per IR's White Paper (2015), 40% of all 1,219 sections across zones were running at line



capacity of 100% or above. Majority of the Zonal Railways are in the range of optimal and higher than optimal utilisation of line capacity. Further, 65% of the 247 high-density sections are running at a line capacity of 100% or above.

➤ Terminal infrastructure and operation: Basic infrastructure facilities required for smooth and efficient operation of terminals and sidings are missing or not functioning. Lack of modern equipment, mechanization, maintenance of fixed

Table 4: Line Capacity Status of High Density Network on IR (No. of sections)

Zonal Rail	<80%	80-100%	100-120%	120-150%	>150%	Total sections
CR	12	4	7	12	5	40
ECoR	5	–	6	8	1	20
ECR	1	5	4	3	3	16
ER	–	3	7	–	–	10
NCR	–	1	5	19	1	26
NER	1	3	6	1	3	14
NFR	–	3	–	5	1	9
NR	3	4	5	7	2	21
SCR	–	14	2	2	2	20
SER	2	2	6	6	–	16
SECR	–	–	3	5	1	9
SR	5	8	4	–	–	17
WCR	1	–	2	2	2	7
WR	–	9	2	9	2	22
Total	30	56	59	79	23	247

Source: White Paper, Indian Railways (February 2015)

➤ Track utilization: IR's performance with regard to track utilization has been declining in the recent years. The CAGR of NTKM per route km declined from 5.6% in Tenth Plan and 4% during Eleventh Plan to -3% during the Twelfth Plan period.

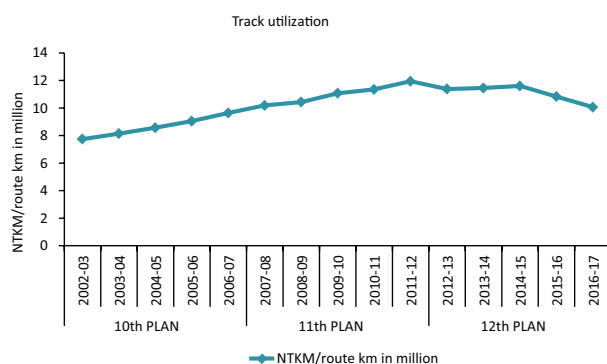


Figure 11: Track utilization during the last three Five Year Plan periods

Source: Indian Railways

assets, security and safety issues, and poor access/ approach road condition are some of the concerns raised by the stakeholders. There are issues related to terminal policy of IR with difficulty faced by interested private players in acquiring land to develop green-field terminals. Indian Railways need to put in place long term perspective plan for terminal infrastructure backed by adequate policy tool to (1) encourage private participation in the operation and management of terminals, and (2) optimum utilization of terminal resources.

➤ Wagon turnaround time: Wagon turnaround time has also registered a continuous decline over the last three Five Year Plans, with maximum plunge reported during the Tenth Plan period. The CAGR recorded during Tenth, Eleventh, and Twelfth Plan periods are



-5.9%, -0.7%, and 0.7%, respectively. It is to be noted that the wagon turnaround time is also dependent upon the speed of freight trains, which has been discussed in the following section.

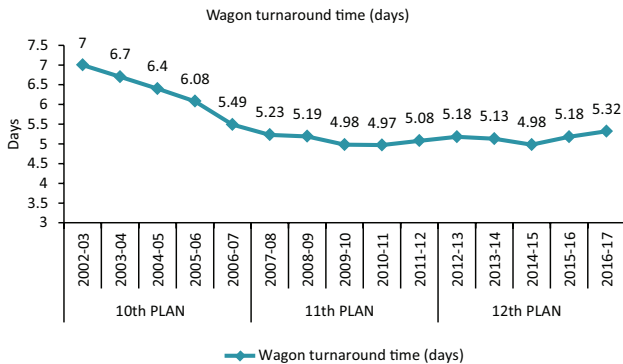


Figure 12: Average turnaround time of wagons during the last Five Year Plan periods (days)
Source: Indian Railways

➤ **Rolling stock:**

Wagon utilization as well as track utilization rate has declined during the Twelfth Five Year Plan. The CAGR recorded for wagon utilization during the Twelfth Plan was 3.4%. The CAGR for track utilization for freight and passenger segment during the Twelfth Plan were -3% and 0.5%, respectively. One of the key measures to increase the wagon utilization level is to induct commodity-specific wagons instead of common pool of wagons for loading of key bulk commodities. The NTKM per wagon per day is comparatively very small than the railway systems of China and Russia¹³.

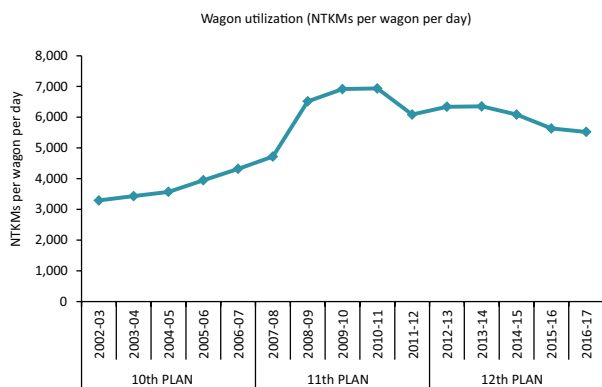


Figure 13: Wagon utilization during the last three Five Year Plan periods
Note: Wagon utilization calculated in terms of 8 wheelers since 2008-09
Source: Indian Railways

Higher transit time: One of the primary and determining factors of modal choice for freight transportation is time-component of logistics. IR has under-performed in providing timely delivery of services, which is one of the reasons for shift of short lead bulk traffic (cement, steel products, containers, etc.) or in some cases long lead traffic (like automobile, parcels, etc.) to roadways. For commodities like automobile and parcel trains, where IR has assured/guaranteed transit time, it has under-performed miserably.

Infrastructural constraints as well as priority of ‘moving people’ have resulted in lower average speed of freight trains. The average speed of goods train, which improved

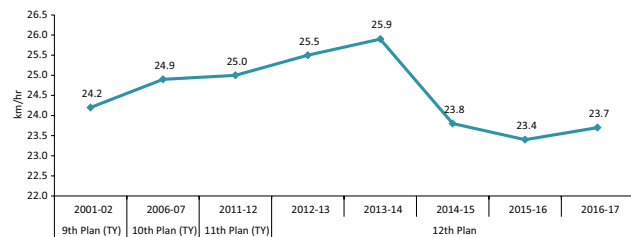


Figure 14: Average speed of goods train during last three Five Year Plan periods (km/hour) TY: Terminal year;
Source: Indian Railways

during the Tenth and Eleventh Five Year Plan periods, declined during the Twelfth Plan period. As per IR’s Annual Statistical Summary, the average speed of goods train dropped at a CAGR of 1.8% from 25.5 km per hour in 2012-13 to 23.7 km per hour in 2017-18. The CAGR of average speed of goods trains during Tenth and Eleventh Plan were 0.2% and -0.4%, respectively.

Price competitiveness of IR: When compared its biggest competitor – road transport, IR’s tariff rates are on the higher side. As per IR’s White Paper (2015), the high density networks of the Indian Railways are facing acute capacity constraints coupled with a low passenger fares thereby leading to increases in freight tariffs to cross subsidize passenger revenues. The uncompetitive freight charges associated with Indian Railways are regularly sighted by stakeholders as a key reason why significant amounts of freight have moved away from railways. Further, improvement in road infrastructure and faster transit through roadways have enabled

¹³https://www.edelresearch.com/showreportpdf-35319/RAILWAYS_-_SECTOR_REPORT-JAN-17-EDEL



road transporters to operator at lower cost and offer competitive rates as compared to railways.

Lack of marketing approach to tap ‘traffic on-demand’: Indian Railways has essentially followed the ‘take-it or leave-it’ approach of freight transportation. IR has to adopt customer centric approach to (1) increase loading of existing/bulk commodities, and (2) diversify its freight basket. In recent times, IR has undertaken several measures (special wagon schemes, commodity-specific operator schemes, terminal-related policies, etc.) to cater to the specific needs of the consignors; however, it has under-performed in almost all areas. Regular dialogue with the stakeholders to understand their requirements and challenges should be initiated by the Indian Railways.

Average Lead: The average lead of freight carried by IR has also become shorter over the period. The fall in average lead was significantly higher during the Twelfth Plan from 644 km in 2012-13 to 561 km in 2016-17 (CAGR of -3.4%). There was a marginal increase in average lead during the Eleventh Plan from 657 km in 2007-08 to 689 km in 2011-12. In comparison, the average transport distance of freight trains in China is around 700 km, which has been declining over the years, however at a much slower rate than India¹⁴.

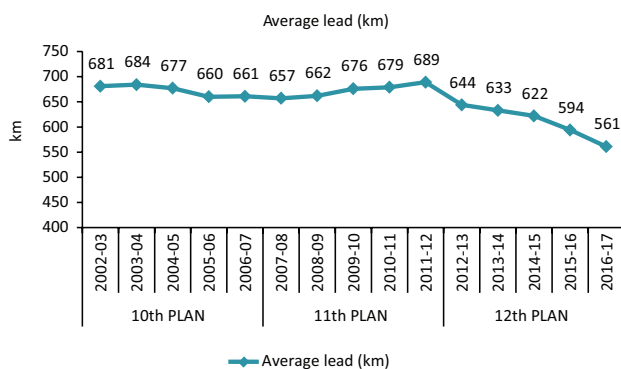


Figure 15: Average lead of freight tonne carried by IR (km)
Source: Indian Railways

Commodities carried by IR

Indian Railways is termed as a bulk carrier since nine bulk commodities account for about 90% of the total freight (in NTKMs) in 2017-18. Of the nine commodities, coal

accounted for 40% of the total NTKMs conducted by the Indian Railways during 2017-18.

When the commodities are segregated in terms of door-to-door service (one of the factors of freight competitiveness), it is seen that key commodities like coal, raw material for steel plants (RMSP), clinker for cement plants and iron ore, falls into this category (site to plants).

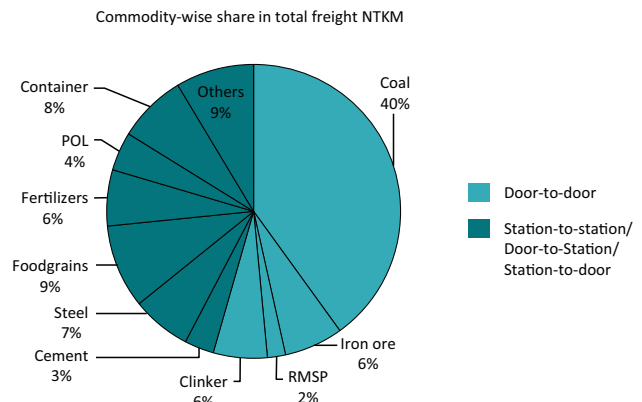


Figure 16: Composition of IR’s freight traffic for 2017-18 (share in total NTKM)
Source: Indian Railways and TERI Analysis

The remaining commodities can be categorized under those where movement takes place from station-to-station (example, automobiles, cement, steel, etc.), door-to-station (example, cement, steel, fertilizers, etc.) or station-to-door (fly ash, etc.). Besides other factors (transit time, volume, and distance), this plays a key role in determining the freight rates for freight commodities by IR.

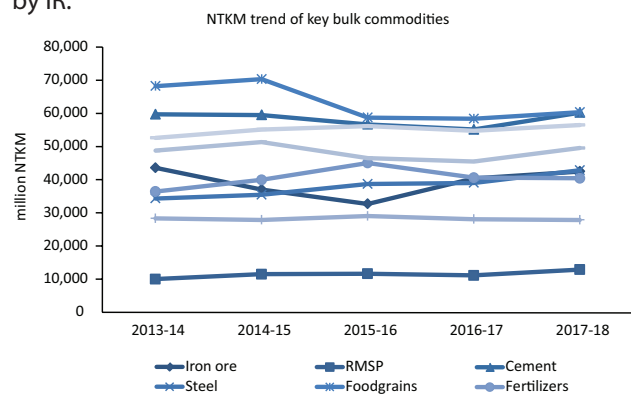


Figure 17: Traffic trend of key bulk materials carried by Indian Railways (2013-14 to 2017-18); Source: Indian Railways

¹⁴<http://data.stats.gov.cn/english/easyquery.htm?cn=C01> (assessed on August 14, 2018)

¹⁵http://www.indianrailways.gov.in/railwayboard/uploads/directorate/stat_econ/MTHSTAT/2018/Freight_March_2018_R.pdf



While the Railways have been losing their share in the overall freight transport pie, the share of railways in the movement of different commodities has been different. For commodities, such as coal and iron ore, which are the mainstay of the Railway business, the shares of transport on railways have declined marginally over the last five years. Foodgrain traffic on Indian Railways declined at a CAGR of about 2.5% during 2013-14 to 2017-18. In case of commodities, such as cement and petroleum products (POL), the railways have been losing shares, mainly on account of availability of alternative mode transport – road for cement and pipeline for POL. The situation is particularly acute in the case of cement, where the shares of loading have come down from almost 44% to 38% in a period of 5 years (2013 to 2018). Other than these bulk commodities, which have historically moved on Railways, commodities such as containers, automobiles, fly ash, parcels, break-bulk, and other white goods have seen limited movement on rail.

However, demands for most of the commodities mentioned above can be met by Indian Railways, and given that the demands for these commodities are expected to increase in the future it is important to identify strategies for capturing their shares on rail. To be able to draw up specific recommendations, that

would be implementable and that could be taken up by the railways and the industries alike, TERI selected six specific commodities for this study. These commodities are cement, automobiles, containers, steel, fly ash, and parcels.

The multi-year study has been undertaken in two phases. Under the first phase, three commodities (Cement, Automobiles, and Containers) were selected while under the second phase three additional commodities (Steel, Fly ash, and Parcels) were selected for detailed analysis. The rationale for selection of each of these commodities is enumerated in the following section.

Initiatives by IR

IR has undertaken several initiatives, with regard to policy as well as infrastructure development, to enhance its capability and attract freight onto railways. These have been discussed, in brief, in this section.

Policy-related initiatives

In the last 10 years, IR has undertaken several policy initiatives to boost private participation in increasing share of railways in freight transportations. These have been listed in Table 5.

Area	Policy	Details
Terminals	Private Freight Terminal (PFT) policy	The PFT policy was launched in 2010 and later revised in 2015. The aim of the policy is to attract private investment in setting up of freight terminals. ¹⁶
Rolling stock	Wagon Leasing Scheme (WLS)	The WLS was launched in 2008, which was revised in 2014. The aim of the policy is to 'develop strong leasing market by encouraging third party leasing of wagons.'
	Liberalised Wagon Investment Scheme (LWIS)	The LWIS policy was launched in 2008, which was revised last year in July 2018 ¹⁷ . It allows private players to invest to procure special purpose wagons and high capacity wagons to operate on specific routes/circuits. These wagons are not merged with wagon pool of IR.
	General Purpose Wagon Investment Scheme (GPWIS)	The policy was introduced in April 2018 to encourage private investment in general purpose wagons like BOX, BCN, BOXN, etc. IR has not covered special purpose wagons under this scheme.

¹⁶ http://www.indianrailways.gov.in/railwayboard/uploads/directorate/traffic_comm/Master_Circulars/MC_PFT_020115.pdf

¹⁷ http://www.indianrailways.gov.in/railwayboard/uploads/directorate/traffic_comm/downloads/Freight_Marketing_2018/Liberalized_02072018.pdf



Area	Policy	Details
Train operation	Special Freight Train Operator (SFTO) policy	IR launched the SFTO policy in 2010, and revised it in 2014. ¹⁸ It aims to provide opportunity to private operators to offer rail services through owned rakes.
	Special Parcel Train Operator (SPTO) scheme	It was launched by IR in 2014 to increase parcel loading on to its trains through private participation. The policy allows private parties to procure rolling stock, including general service parcel vans, refrigerated vans, etc., and operate it as special parcel trains.
	Automobile Freight Train Operator (AFTO) policy	The AFTO was launched in 2010 and was revised in 2014. The policy provides opportunity to the private logistics companies/transporters to run freight trains catering to the automobile sector. The operator can induct new higher capacity wagons, provided it meets the conditions set by IR's Research Design and Standard Organization (RDSO).
Logistics facility	Development of Automobile & Ancillary Hub	In parallel to the AFTO policy in 2010, the Railways also launched "Development of Automobile and Ancillary Hub" policy to facilitate end to end logistics for automobiles. The aim of the policy is to provide opportunities to automobile manufacturers to do bulk transportation by rail and do secondary distribution to consuming centres in the immediate catchment areas from such hubs.
Tariff-related scheme	Long-term Tariff Contract (LTTTC) scheme	The LTTTC scheme was introduced by IR in 2017. Through this, both the parties agree to a pre-determined price escalation principle, where cement companies can avail freight rebate on incremental loading/revenue.
Parcel business	Comprehensive Parcel Leasing Policy (CPLP)	The policy with regard to parcel space leasing was brought in by the Indian Railways in March 2006. Indian Railways launched the modified CPLP in April 2014. The objective is to increase private/lease holder participation in carrying parcels by Indian Railways.
	Parcel Cargo Express Train (PCET) policy	PCET policy was introduced in 2007. It set out the set of rules for the operation of leased trains for parcel movement.

Source: Indian Railways

During the period of policy implementation, several issues arise which the Indian Railways try to resolve by bringing in amendments to the policy. One of the key recommendations, which also emerged from the discussions TERI had with various groups of stakeholders, is the need to make customer-centric policies. Rounds of deliberations with non-railway parties need to be undertaken before finalizing the policies, so as to reduce the number of amendments required later and to maintain consistency of policies.

Infrastructure development-related initiatives

Besides new line, doubling, gauge conversion, electrification, track renewal, etc., the Indian Railways has been engaged in mega projects to augment its capacity to handle freight. Some of these have been discussed here.

Dedicated Freight Corridor project

- DFC project was conceived in 2004-05 and the Dedicated Freight Corridor Corporation of India Ltd

¹⁸ http://www.indianrailways.gov.in/railwayboard/uploads/directorate/traffic_comm/Master_Circulars/sfto0001_221214.pdf



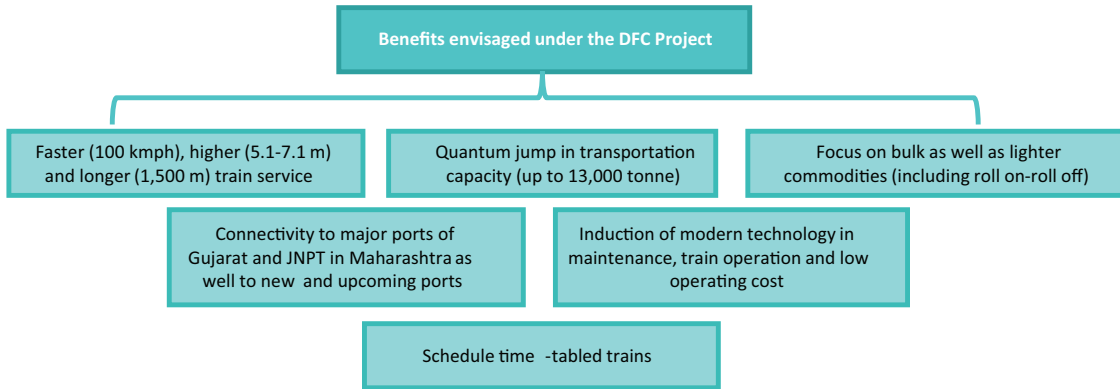
(DFCCIL) was set up in October 2006 to undertake the project. The Ministry of Railways has a 100% equity stake in the special purpose vehicle.

- With an investment of over Rs 81,459 crore, DFC is one of the biggest ongoing infrastructure projects in the country¹⁹.
- The DFC project is expected to be fully commissioned by 2020-21.

- Projected to cater to several traffic streams – coal for the power plants in Uttar Pradesh, Delhi, Haryana, Punjab, and Rajasthan. Other key commodities projected to be transported on this corridor include finished steel, foodgrains, cement, fertilizer and limestone, and general goods.

Western Corridor - WDFC

- The 1,520 km Western Dedicated Freight Corridor



Eastern Corridor - EDFC

- The 1,856 km Eastern Dedicated Freight Corridor (EDFC) is being developed between Ludhiana in Punjab to Dankuni in West Bengal at an estimated cost of Rs 30,358 crore²⁰. The key funding agency for the corridor is the World Bank, contributing a total of Rs 13,625 crore²¹, (45% of the total cost of EDFC).

(WDFC) is being developed between Ludhiana in Punjab to Dankuni in West Bengal at an estimated cost of Rs 51,101 crore²². The key funding agency for the corridor is the Japan International Cooperation Agency (JICA), contributing a total of about Rs 38,772 crore (76% of the total cost of WDFC).

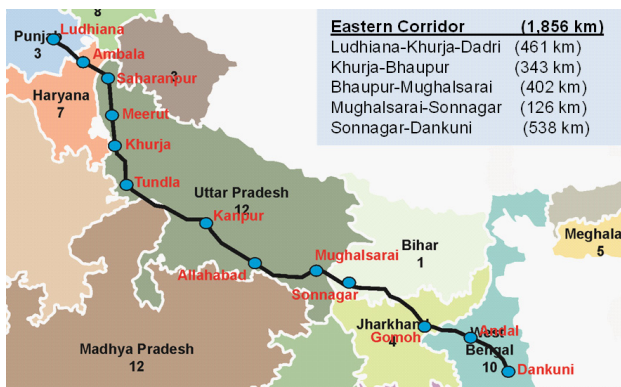


Figure 18: Route map of Eastern DFC
Source: DFCCIL

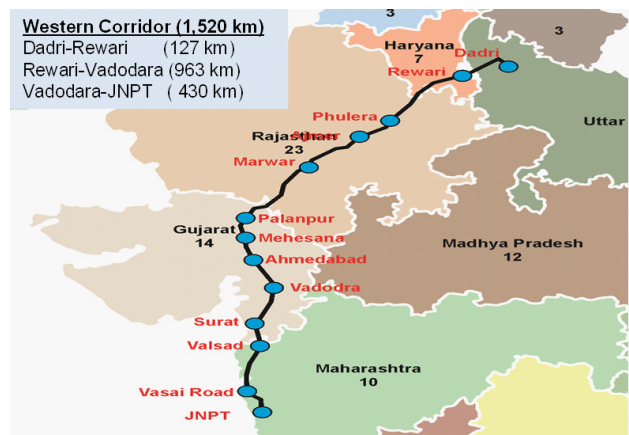


Figure 19: Route map of Western DFC
Source: DFCCIL

¹⁹ http://www.dfccil.gov.in/dfccil_app/Project_Funding

²⁰ <http://164.100.47.190/loksabhaquestions/annex/15/AU1357.pdf>

²¹ <http://164.100.47.194/Loksabha/Questions/QResult15.aspx?qref=2363&lsno=16>

²² <http://164.100.47.190/loksabhaquestions/annex/15/AU1357.pdf>



- The traffic will mainly comprise containers from JNPT and the ports of Mumbai, Pipavav, Mundra, and Kandla. Besides containers, other commodities moving on the Western DFC will be petroleum-oil-lubricant (PoL) products, fertilizer, food grains, salt, coal, iron, steel, and cement.

Track renewal

In addition to the investments made in infrastructure projects (new line, doubling, gauge conversion, and electrification) discussed earlier, Indian Railways has been spending substantial amount of money towards track renewal. IR’s spending under the programme stood at Rs 15,741 crore during the Tenth Plan, Rs 15,918 crore during the Eleventh Plan, and Rs 20,448 crore during the Twelfth Plan. The CAGR of investment related to track renewal for the Tenth, Eleventh, and Twelfth plans are 11%, 1%, and 9%, respectively.

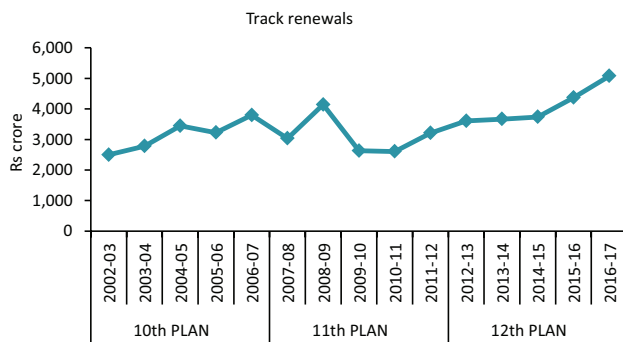


Figure 20: IR’s investment towards track renewals
Source: Annual reports, Indian Railways

Rationale for selection of commodities

The aim of this study is to identify the underlying factors which have resulted in such declining railway shares as well as to draw up specific implementable strategies for the Railways to retrieve some of its declining shares. In addition, the study would identify the barriers or hurdles which might exist in the present nature of operations and organization of the Railways which might be limiting the growth of the Railways.

The rationale for the selection of each of the commodities mentioned herein is detailed as follows:

Cement: Cement forms about 10% of the total freight moved on the railways both in terms of originating tonnes and tonne kilometres moved, and it is the commodity with the second highest share in railway freight revenues. However, this is a commodity for which the average leads (i.e. distance) carried on the railways has been continually on the decline and both the Railway statistics and the numbers published by the Cement Manufacturers Association of India show that there has been an increasing shift of cement traffic away from the railways onto roads. While the cement industry has continually shown its interest in moving larger shares of their traffic by rail, they have been unable to do so and have cited several reasons ranging from high costs of carriage to lack of wagons for carrying their loads. Given the apparent interest shown by both the Railways and the cement industry in increasing cement shares, this commodity becomes a natural first choice in the commodity list chosen for this study.

Automobiles: Auto plants are located at a handful of locations in the country but transport finished vehicles all across the country. Given these long-lead movements, automobiles have a natural advantage in moving by railways. Apart from the long-distance criterion, automobile traffic is amenable to be aggregated into train load. These factors make the ‘manufactured’ automobile a perfect commodity to be moved by rail. However, almost all the traffic of the automotive industry is moved by road transport. The Railways have repeatedly, through measures, such as introduction of special wagons and the Automobile Freight Transport Operator (AFTO) service policy, shown interest in hauling a greater volume and share of the automotive industry traffic. However, the AFTO policy received a limited and lukewarm response until recently. Some interest has been generated in the recent past; however, critical traffic volume has not reached yet. Given the large growth potential projected for the automotive industry, the study of freight movement of this industry, and identifying the limitations holding back its movement via railways makes this an important commodity to study.

Container: Largely driven by a services sector growth, India has been seeing a rapid growth in the white goods and fast moving consumer goods markets. Given the



convenience of moving these goods in containers, containerized traffic has seen a very rapid growth over the last decade. Identifying this growth potential in container traffic, the Indian Railways have undertaken measures such as 'opening up' the rail-based container traffic movement to private operators almost a decade ago in 2006. Such measures saw an initial increase in the container traffic volumes on railways continuously between 2007 and 2010. Thereafter, there has been a gradual decline in the volumes of container traffic loaded onto the railways. This scenario where the Railways efforts have not been effective, even in the presence of continually increasing demand for container movement, lends itself for a closer inspection. It is therefore that containers have been selected as the third commodity of analysis for this study.

Steel: India is currently ranked third in the world with regard to crude steel production and is poised to become the second largest in the next 2–3 years. Crude steel production in India has been rising consistently over the past decade with a CAGR of 8.6% from 46.5 mt in 2005-06 to 97.4 mt in 2015-16, while finished steel production has grown at a CAGR of 6.9% from 46.6 mt (2005-06) to 91 mt (2015-16) over the same period. At the same time, capacity utilization has decreased from 91% to 78% over the same period, indicating significant potential to increase production further. Steel as a commodity is estimated to have the seventh largest share in revenue earning freight traffic for railways in 2017-18. Currently, it is estimated that railways carry only 18% of the total steel and related products volume available for transport. The potential for growth in steel production and the low share of railways in transport of steel over the country provides a significant opportunity for the railways to increase its freight volumes and earnings from steel.

Fly ash: Currently, a total of about 105 million tonnes of fly ash is generated by the thermal power plants spread across the country. Of this, a very small share is being utilized or moved to the consumption points, while the remaining/unutilized fly ash is largely dumped near the plants. As per preliminary investigation, it is seen that railways carry a miniscule share in total utilized fly ash, that is, about 2%. Also, given the fact that the contribution of thermal power plants in electricity generation is going

to dominate the Indian power generation market in the next 15 to 20 years, fly ash generation and therefore its utilization will continue to be managed by the generators/transporters.

Parcels: The share of railways in overall parcels movement in the country is minimal, with majority of parcels traffic moving through road transportation. Additionally, there has been a consistent decline in the growth of parcel movement on Indian Railways over the years. As per data currently available with regard to the volume of parcel moved on railways, the traffic grew at a negative CAGR of 4.2% between 2013-14 and 2017-18. This is a major concern and interactions with the Indian Railways indicate that it is keen to identify the issues and resolve the same in order to increase parcel traffic onto the system.

Approach to the study

As mentioned earlier, this research work aims to study in detail and acquire an understanding of factors which have resulted in the declining Railway shares in the six selected commodities. A thorough understanding of such factors would help in ascertaining specific measures which might be required for the Railways to first stall the declining shares, and then improve its share in the overall freight traffic.

To be able to draw up a strategy for studying the six commodities identified and the logistics requirement for the same, the approach for this research looked at a demand–supply mapping and the market trends and scenarios for the particular commodity.

The study approach has been broken down into the following steps:

1. Identifying commodities for study
2. Determining the total volumes of traffic generated by these industries
3. Identifying supply chain for each commodity and determining volumes of movement on each leg
4. Determining the shares of different commodities presently moving on railways
5. Identification of barriers leading to the decline in shares of these commodities on IR



6. Developing commodity-specific strategies for increasing railway shares
7. Coordinate with industry and Railways to streamline strategies for seamless action

While the study team aimed to follow this approach for all the commodities, lack of data and information regarding transport demand flows has been a limitation in certain instances.



ANNEXURE 1

Investment by IR in infrastructure development (Rs crore)

		New Line	Gauge conversion	Doubling	Electrification	Track renewals
10th Plan	2002-03	1,315	812	578	250	2,496
	2003-04	1,493	1,134	532	148	2,781
	2004-05	1,690	1,121	488	115	3,444
	2005-06	1,991	1,242	687	73	3,224
	2006-07	2,488	2,136	1,202	241	3,796
	2007-08	2,667	3,022	1,670	464	3,035
	2008-09	3,151	2,989	1,831	783	4,141
11th Plan	2009-10	3,638	3,320	2,372	713	2,629
	2010-11	5,262	2,845	2,115	640	2,604
	2011-12	5,327	2,527	2,251	830	3,210
	2012-13	5,292	2,401	2,470	964	3,604
	2013-14	5,801	2,874	2,961	1,265	3,666
12th Plan	2014-15	7,107	3,520	3,859	1,387	3,734
	2015-16	13,210	3,616	10,472	2,265	4,368
	2016-17	14,320	3,770	9,093	2,871	5,076

Source: Year Books, Indian Railways



ANNEXURE 2

IR's expenditure sources over the last three Five Year Plans

		GBS	EBR/Market borrowing	Internal Resources	Total
10th Plan	2002-03	4,264	2,515	1,977	8,756
	2003-04	5,315	2,807	2,492	10,614
	2004-05	5,493	2,991	3,009	11,493
	2005-06	5,312	3,731	6,750	15,793
	2006-07	6,189	4,611	11,643	22,443
	2007-08	8,668	14,948	5,364	28,980
	2008-09	10,110	18,941	7,284	36,335
11th Plan	2009-10	17,716	12,196	9,760	39,672
	2010-11	19,485	11,528	9,680	40,693
	2011-12	21,060	9,091	16,316	46,467
	2012-13	25,710	15,142	9,531	50,383
	2013-14	29,055	15,225	9,709	53,989
12th Plan	2014-15	31,624	18,261	15,347	65,232
	2015-16	35,008	39,066	19,446	93,520
	2016-17	45,232	52,579	12,125	1,09,936
	2017-18 (R)	40,000	69,100	10,900	1,20,000

Source: Budget documents, Indian Railway



ANNEXURE 3

Freight traffic trend on Indian Railways (million NTKM)

	2013-14	2014-15	2015-16	2016-17	2017-18	CAGR
Coal	269,713	297,262	279,604	245,366	263,402	0.59%
Iron ore	43,603	37,094	32,774	40,492	42,647	-0.55%
RMSP	10,060	11,570	11,744	11,289	13,062	6.75%
Cement	59,712	59,559	56,746	55,249	60,374	0.28%
Steel	34,342	35,511	38,788	39,155	43,010	5.79%
Foodgrains	68,227	70,364	58,820	58,506	60,497	-2.96%
Fertilizers	36,452	40,023	45,140	40,752	40,607	2.74%
POL	28,345	27,919	29,117	28,228	28,024	-0.28%
Container	48,789	51,404	46,603	45,630	49,731	0.48%
Others	52,626	55,194	56,266	54,859	56,664	1.87%
Total	651,869	685,900	655,602	619,526	658,018	0.23%

RMSP: Raw material for steel plants; POL: Petroleum, oil and lubricants
Source: Indian Railways





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