

High Speed Trains in India: A journey over Seven Decades

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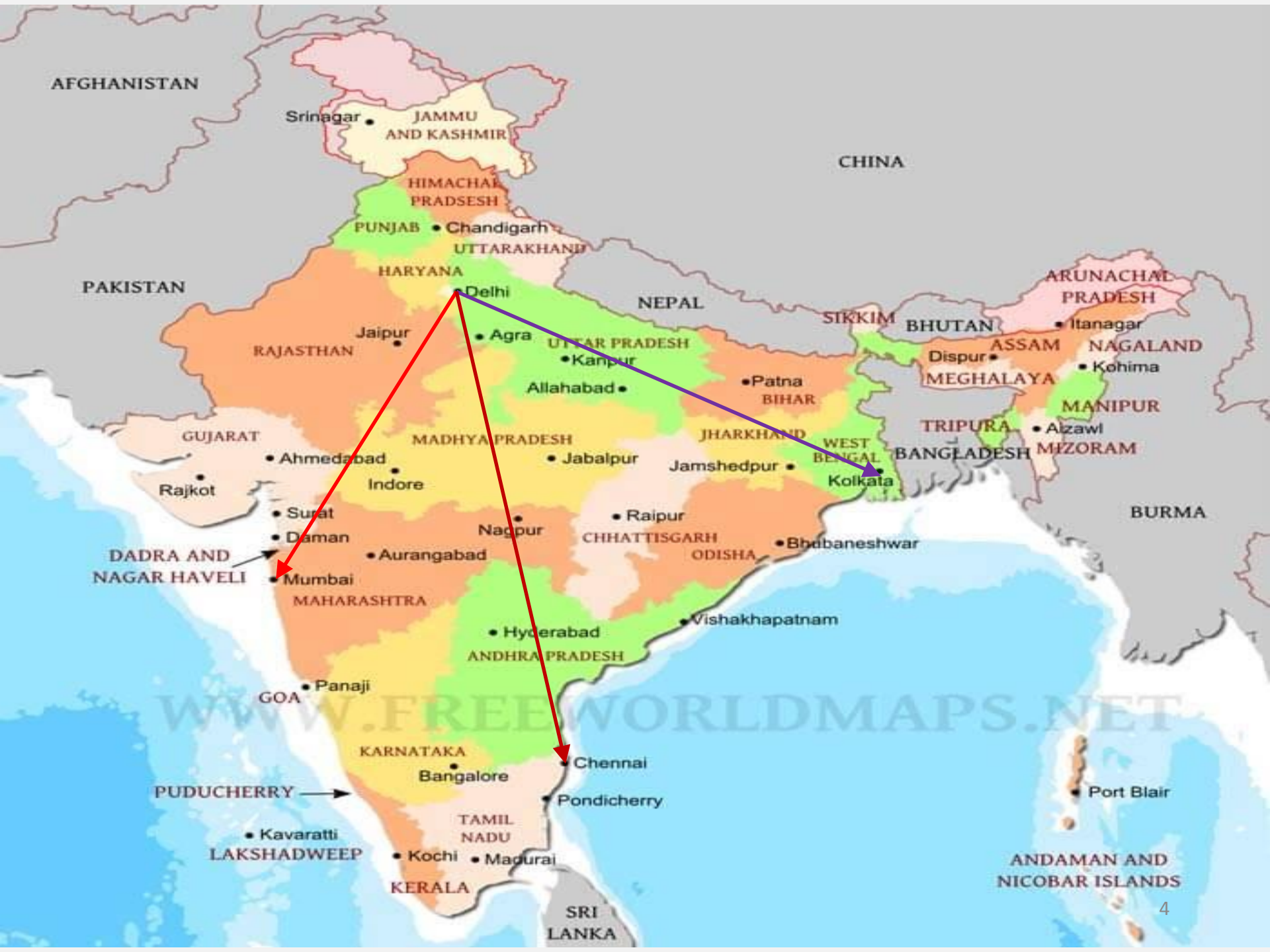
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Planning with a Steady Hand

- India's economy was actively driven by the five year plans (FYP) for the five decades after independence in 1947.
- The objectives and targets of Indian Railways were always reflected in the plan document.
- The First Five Year Plan was launched in 1951 and the 10th in 2002.
- In these five decades, the focus was on track renewals, better signalling technology, easing of congestion, electrification, efficient freight movement, introduction of powerful locomotives, emphasis on financial viability, energy conservation, modernization, safety etc.
- Rail travel at higher speeds was promoted, where feasible.
- However, no FYP document till the 11th five year plan mentioned high speed train travel, with any degree of clarity or emphasis.

Increasing Speed in Stages

- India's first three superfast trains, however, were introduced in 1969, 1972 and 1976. The seventies was a decade when higher speed travel was a commercial and technological success.
- The performance of these trains over the decades, however, reveals that the engineering objective of safe high-speed travel, while successful, got compromised by socio-political compulsions.
- This is revealed in the following graph by the initial and present number of halts and the speed.



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Kohima

ASSAM

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Alzawi

TRIPURA

BANGLADESH

WEST BENGAL

Kolkata

BURMA

GUJARAT

Ahmedabad

Rajkot

Surat

Daman

Mumbai

MAHARASHTRA

Panaji

GOA

Aurangabad

HYDERABAD

ANDHRA PRADESH

RAIPUR

CHHATTISGARH

ODISHA

Bhubaneswar

Vishakhapatnam

DADRA AND NAGAR HAVELI

Mumbai

PUDUCHERRY

Bangalore

KARNATAKA

Chennai

PONDICHERRY

LAKSHADWEEP

Kavaratti

Kochi

Maguraj

KERALA

TAMIL NADU

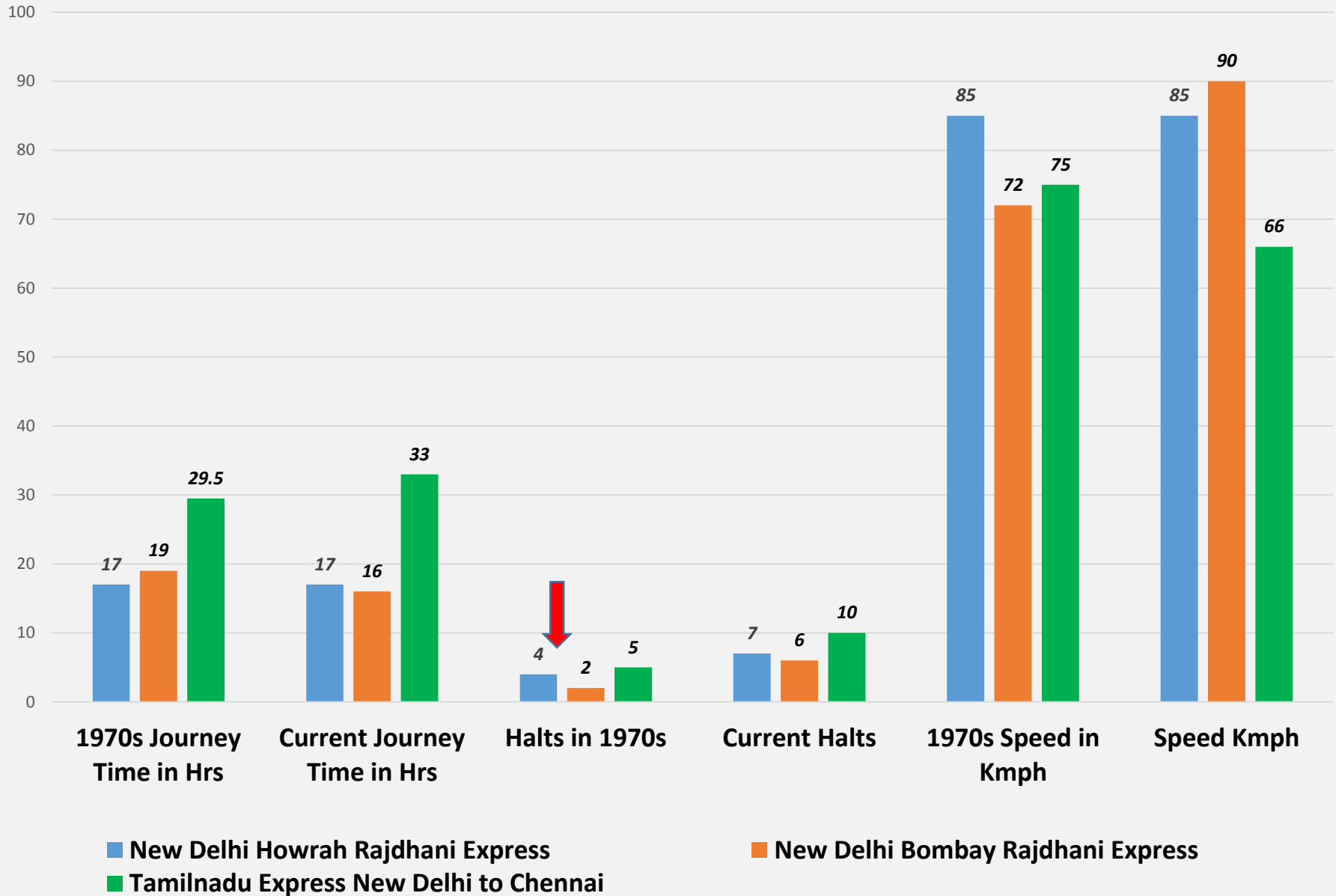
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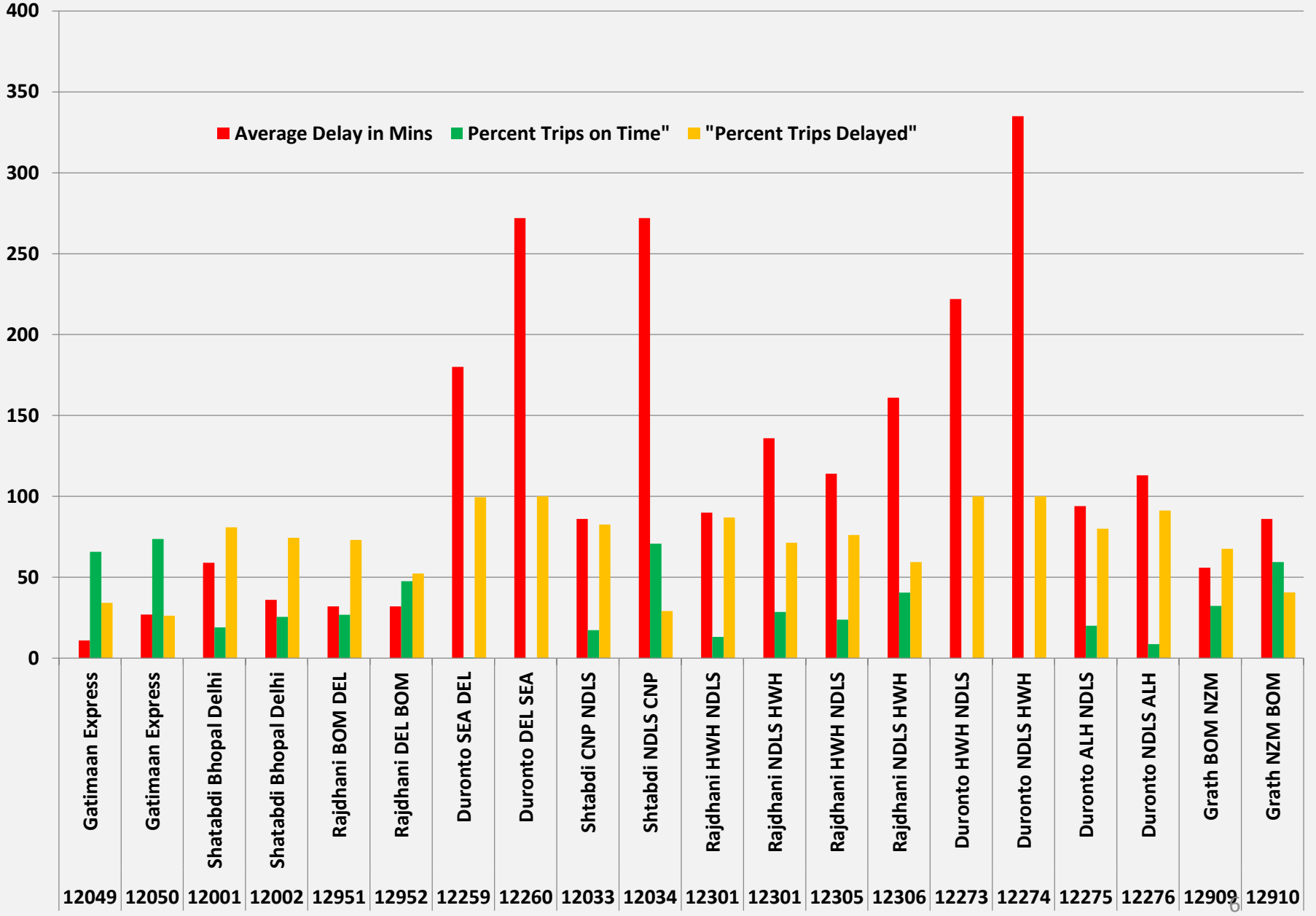
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High Speed Trains of India in 1970s and Today



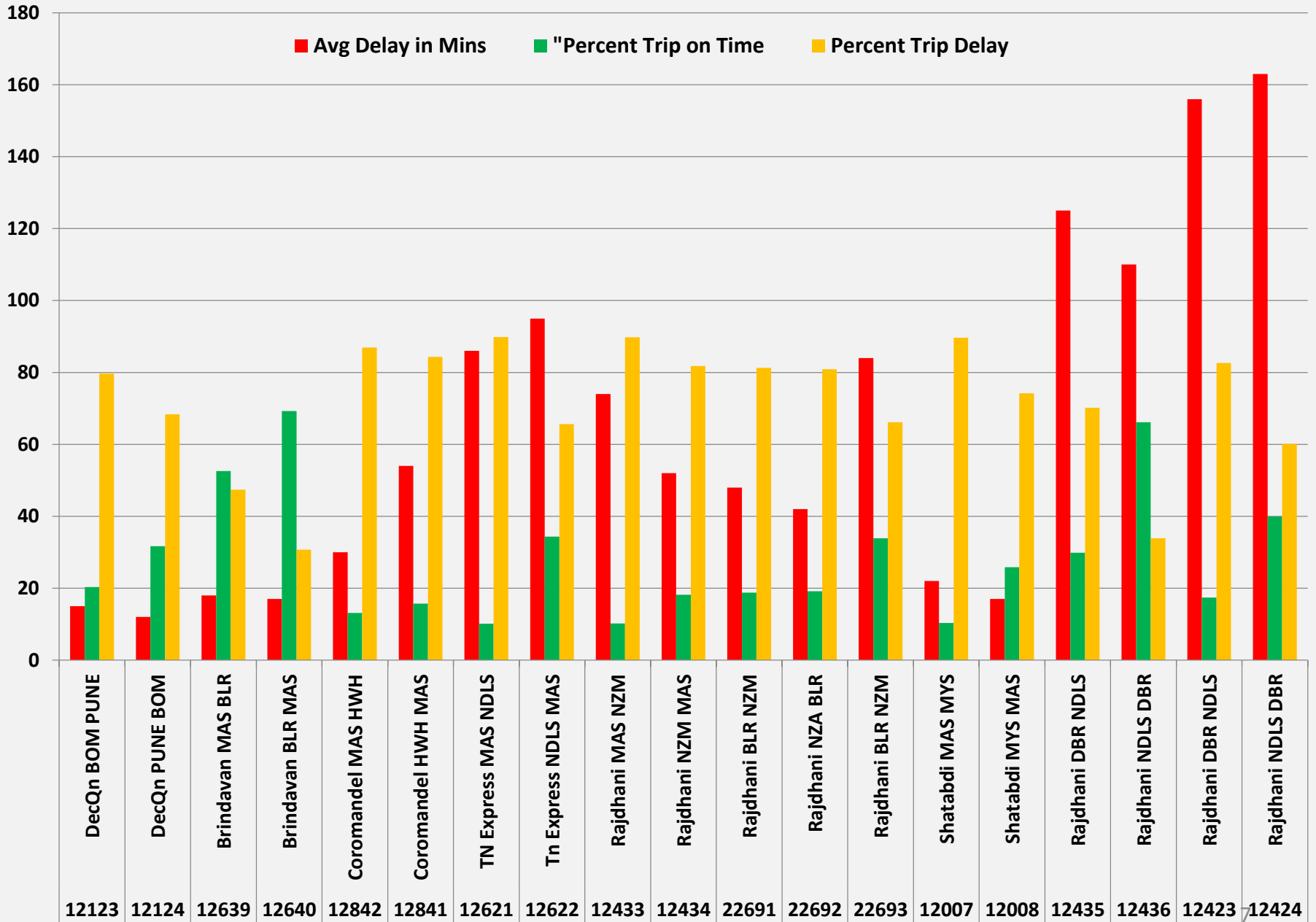
Annual Data for 2017

Source: Indian Railways



Annual Data for 2017

Source: Indian Railways



Indian Railways White Paper: Vision 2020

- The white paper was presented to the Indian Parliament on 20 December, 2009.
- It was focused on four strategic national goals, namely,
- Inclusive development, both geographically and socially;
- Strengthening national integration;
- Large-scale generation of productive employment;
- Environmental sustainability,
- Some specific points included
- Enhancing capacity, doubling or quadrupling of selected lines and complete segregation of passenger and freight lines on high density routes, including the main routes from Delhi to the three main metropolises, viz., Kolkata, Mumbai and Chennai, with the building of dedicated freight corridors.
- Raising the speed of freight trains on Indian Railways, to a maximum of 60 to 70 km/hr and that of passenger services to between 160 and 200 km/h.
- On the front of high speed rail travel, the vision document aimed to raise the speed of regular passenger trains to between 160 & 200 km/h on the segregated routes.

2013 report of the NTDPC [National Transport Development Policy Committee]

- *One crucial observation: A review of the most important projects carried out today around the globe highlights that the potential demand for services must be particularly high in order to make investment in them **socially profitable** and that these projects must target the corridors linking densely-populated metropolitan areas, suffering from severe road congestion, and having deficient air links.*
- The final report, titled India Transport Report: **Moving India to 2032**, had many recommendations for the Indian Railways. Two among them:
- Indian railways have to be run as a business on sound commercial principles. It is essential that the commercial and social roles are kept distinct and separate.
- The two categories of projects must not be mixed up and must be handled by different project organizations with different project leaders. The lack of clarity between its public-service obligations and commercial objectives affects several other operational practices/ financial systems of IR, making it even more difficult to reconcile these roles.

Table 1.8
Passenger Growth for IR

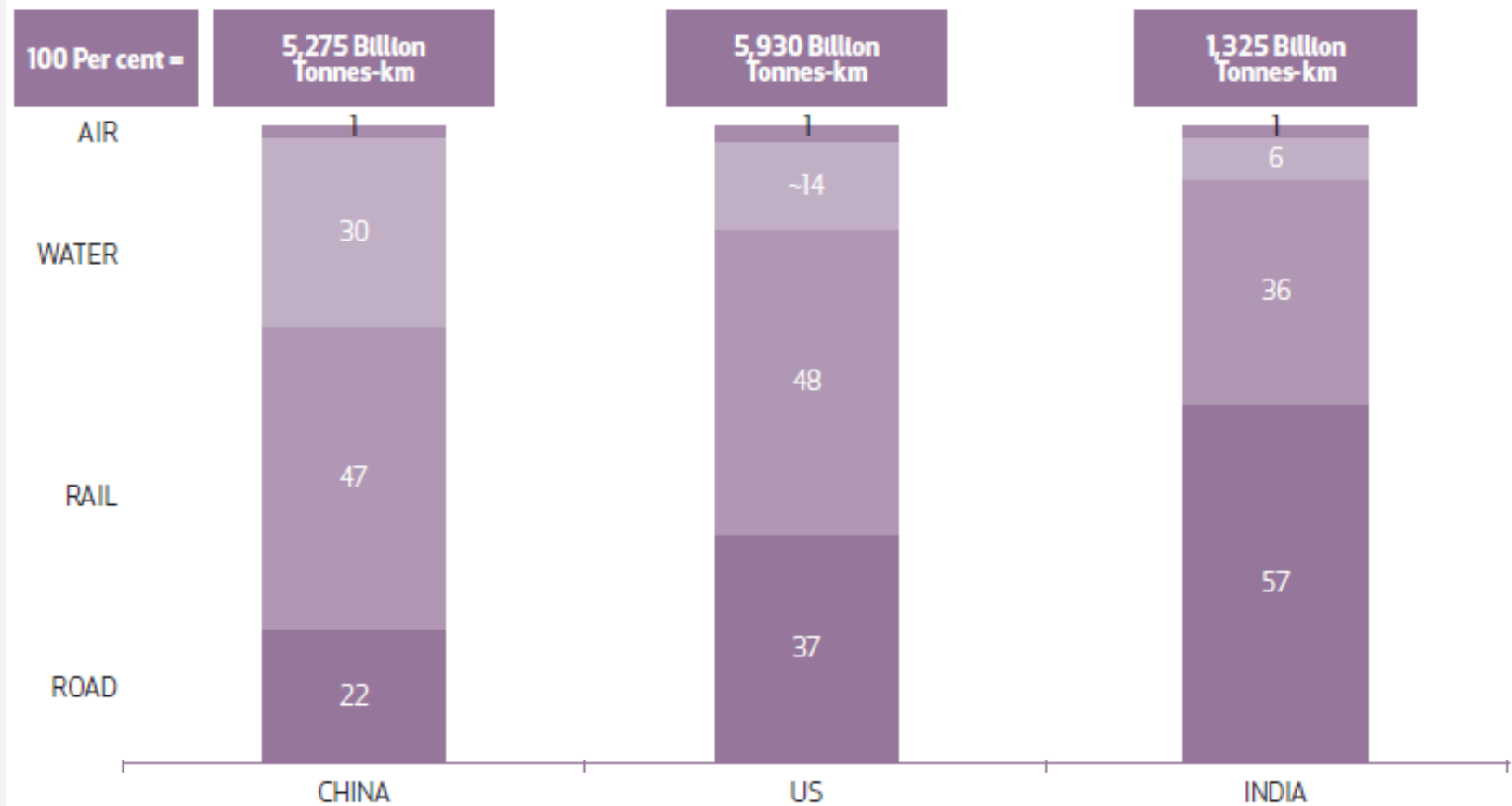
YEAR	PASSENGER KILOMETRES (IN BILLIONS)		
	SUBURBAN (PER CENT)	NON-SUBURBAN (PER CENT)	TOTAL
2011-12 ^A	144 (14)	903 (86)	1,047
2016-17	189 (12.5)	1,320 (87.5)	1,509
2021-22	253 (11)	2,047 (89)	2,300
2026-27	342 (9.5)	3,254 (90.5)	3,596
2031-32	461 (8)	5,304 (92)	5,765

Source: NTDPC, Report of the Working Group on Railways (NTDPC).

Note:

1. A: Actual (from Railways Yearbook 2011-12)
2. GDP growth projections:
 - 12th Plan: 6.9 per cent (projected in 12th FYP document);
 - 13th Plan: 8 per cent; 14th Plan: 8.5 per cent; 15th Plan: 9 per cent (NTDPC estimates).

Table 1.2
Mode Share in Freight Traffic
 (Per cent of NTKM)



Source: McKinsey's Building India: Transforming the nation's Logistics Infrastructure, 2010.
 Note: Mode share estimated for 2007, excluding pipelines.

New white papers on Indian Railways “Lifeline of the nation” [February 2015] and “National Rail Plan 2030” [December 2016]

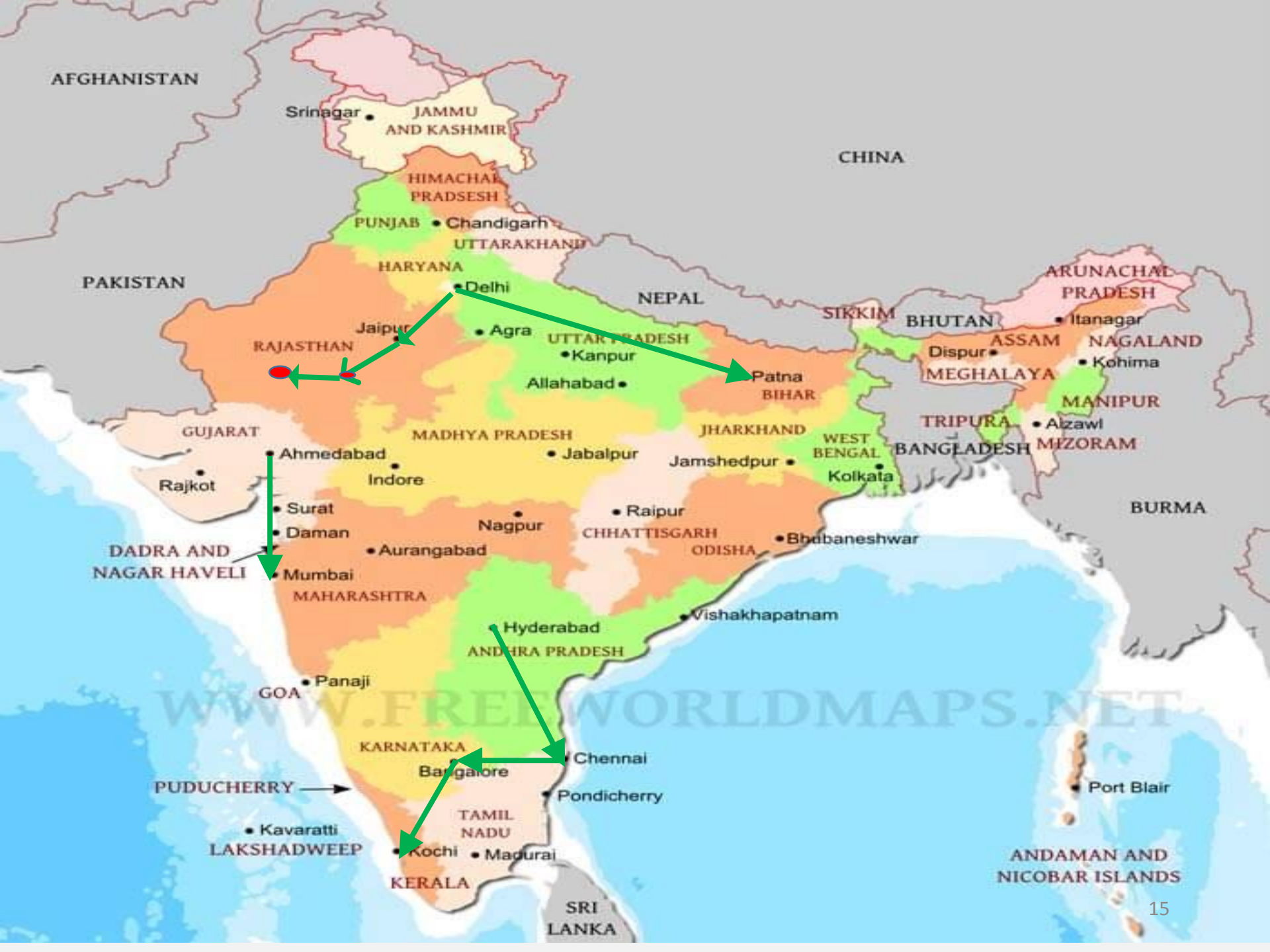
- In the Feb 2015 document, the focus was on FDI in Railways, examination of financial requirements of IR, implementation of HSR projects, examination of viability of PPP in Railways projects etc.
- NRP 2030 was launched through a website, accessible at <http://www.nationalrailplan.in>
- The objective of NRP 2030 is to enable long term growth of Indian Railways’ in a comprehensive manner.
- This would be done by receiving inputs from “all the stakeholders including State Governments, public representatives and other relevant Central Ministries” and thereby provide the long term perspective.

National Rail Plan 2030

- According to this plan as many as 13 corridors are being studied for implementation of the HSR service.
- They are categorized under the Diamond Quadrilateral Routes and other important routes connecting commercial centres.
- They are at different levels of feasibility and pre-feasibility study.
- One project, Ahmedabad Mumbai corridor is under implementation.
- Companies from Australia, Japan, China, France, Spain, the United Kingdom, etc. are involved in these projects with Indian counterparts or on their own.

High Speed Rail Corridors - Studies/Status

Sl. No.	Route Description	Study Status	Agency
Diamond Quadrilateral Routes			
1	Delhi - Mumbai	Feasibility Study in Progress	Consortium of Third Railway Survey and Design Institute Group Corporation (CHINA) and Lahmeyer International (India) Pvt. Ltd, India
2	Mumbai - Chennai	Feasibility Study in Progress	SYSTRA - RITES - E&Y Consortium
3	Chennai - Kolkata	Yet to be taken up	
4	Delhi - Kolkata	Feasibility Study in Progress	Consortium of M/s INECO (SPAIN) - M/s TYPASA- M/s Intercontinental Consultants and Technocrats Private Limited, India
5	Delhi - Chennai	Delhi-Nagpur section of this corridor is being taken up as Phase - I under Government to Government cooperation.	Planning study report for this High Speed Rail Corridor by China Railway SIYUAN Survey and Design Group Co. Ltd has been completed. Project Feasibility Study is yet to be taken up by SIYUAN.
6	Mumbai - Kolkata	Mumbai-Nagpur section of this corridor is being taken up as Phase - I under Government to Government cooperation.	ADIF, Spain and INECO, Spain
Other Important Corridors			
7	Mumbai - Ahmedabad	Project under implementation	National High Speed Rail Corporation Ltd. (NHRCL), under Japanese financing
8	Delhi - Chandigarh - Amritsar	Pre-Feasibility Study Completed	SYSTRA - RITES Consortium
9	Howrah - Haldia	Pre-feasibility Study	INECO, Spain
10	Delhi - Patna	Pre-feasibility Study	Mott McDonald, India
11	Thiruvananthapuram– Mangalore	DPR Completed	DMRC, India
12	Hyderabad-Dornakal- Vijayawada-Chennai	Pre-Feasibility Study	Parsons Brinckerhoff India Pvt. Ltd.
13	Chennai - Bengaluru – Coimbatore – Ernakulam	Pre-Feasibility Study	Consortium of JARTS (Japan Railway Technical Service) and Oriental Consultants



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Itanagar

PAKISTAN

Jaipur

Agra

UTTAR PRADESH

Kanpur

Dispur

ASSAM

NAGALAND

Kohima

RAJASTHAN

Allahabad

Patna

BIHAR

MEGHALAYA

TRIPURA

Alzawi

MANIPUR

GUJARAT

MADHYA PRADESH

JHARKHAND

WEST BENGAL

BANGLADESH

MIZORAM

Rajkot

Ahmedabad

Jabalpur

Jamshedpur

Kolkata

BURMA

Surat

Indore

Nagpur

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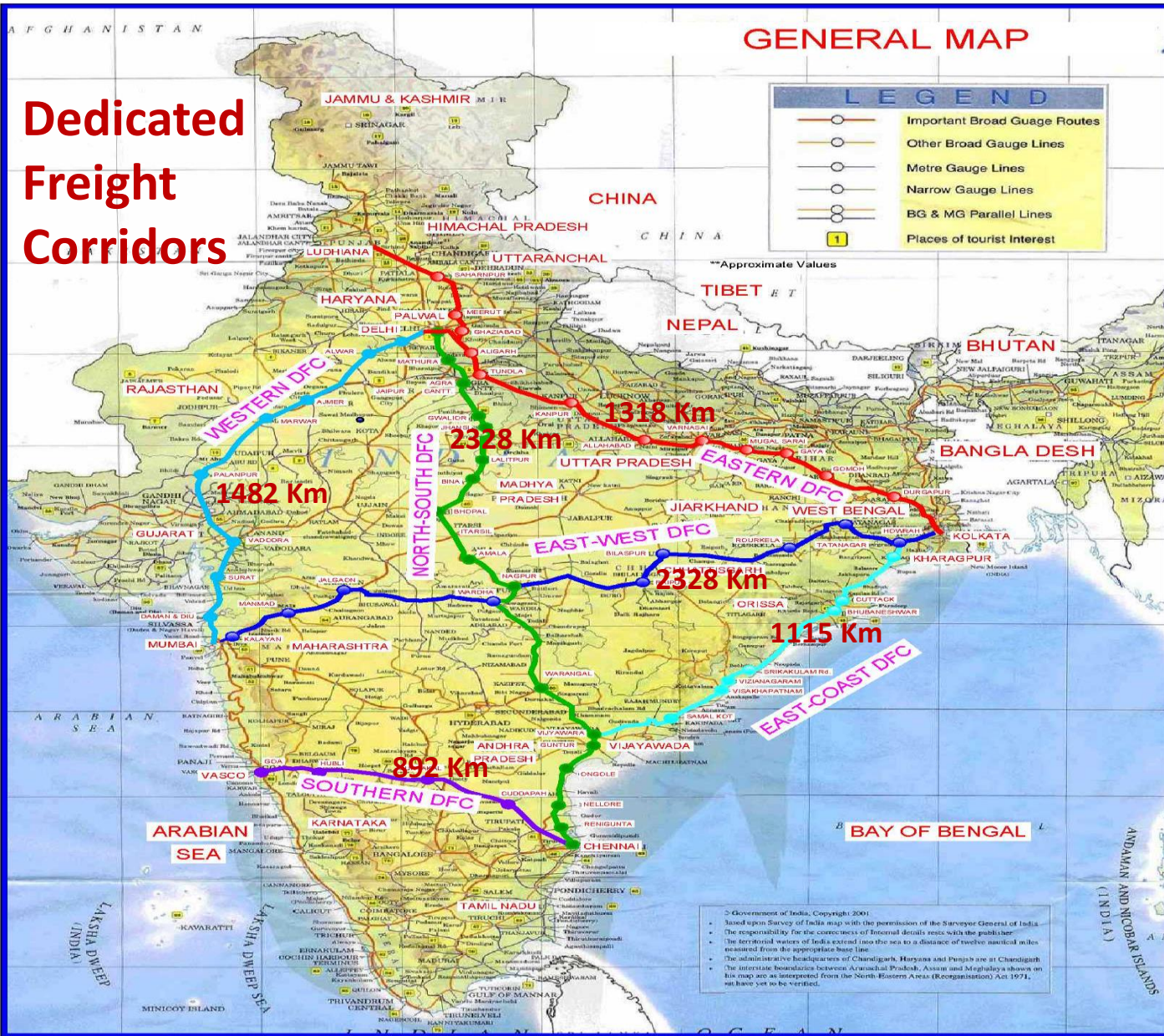
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Dedicated Freight Corridors

- Among six Dedicated Freight Corridors, two corridors i.e Eastern and Western DFC are under construction and remaining four DFCs i.e. East- West, North-South, East-Coast and Southern Corridors are at the planning stage.
- These six DFCs are:
 - North-South Corridor-2328 km
 - East-West Corridor-2328 km
 - East-Coast Corridor - 1115 km,
 - Southern Corridor-892 km,
 - Eastern Corridor-1318 km
 - Western Corridor-1482 km



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- Based upon Survey of India map with the permission of the Surveyor General of India
- The responsibility for the correctness of Interval details rest with the publisher
- The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line
- The administrative boundaries of Chandigarh, Haryana and Punjab are at Chandigarh
- The interstate boundaries between Arunachal Pradesh, Assam and Meghalaya shown on this map are as interpreted from the North-Eastern Areas (Reorganisation) Act, 1951, and have yet to be verified.

Focus Areas for watchful use of HSR's high value assets

- Extensive Training for,
- Operations Personnel: On board / on ground
- Service Personnel: On board / on ground
- Users: On board / on ground esp. how to use the physical assets so created, given the high costs of creation of assets.
- Durable design of the interior keeping in mind the users and operators given the high technology, high-tech asset being created.

Public Policy Study Interface - 1

- The studies should focus on:
- Redundancy and Preventive Maintenance with a view identifying optimal cost for creating equally efficient alternatives, within the overall Indian Railway system.
- As the Ahmedabad-Mumbai corridor progresses calculation of quantum of “mode shift” for other corridors, e.g., Bangalore to Chennai
- Other HSR countries have established their own norms. India, the latest entrant, should it learn from others or establish own norms?

Public Policy Study Interface - 2

- Since HSR is directly related to productivity, studies on productivity changes as a result of HSR travel in various DFC routes should be worked out.
- Spill-over effects based study, centred on:
 - Mode Diversion,
 - Reduction in Carbon Footprint.
- Demonstration Effect: Just as the Golden Quadrilateral has revolutionized inter-city bus travel in India, the effect of HSR on national travel patterns in general, and railways in particular, should be focused upon.

Public Policy Study Interface - 3

- Given increasing Cyber Space speeds, advances in digital technology, IOT and AI what elements can be introduced in the HSR projects being planned in India? What among these can pose a competition to the HSR concept in the Indian context?
- NITI Aayog and the Indian Railways should study the Long Term requirements for sources of funding, asset management and technology inputs from point of view of how indigenization can help in the long run.

Role of HSR in India

- Catalyzer for rest of IR?
- Carbon footprint moderator?
- Transport mode transformer?
- Travel comfort at high speed?
- Time saver?
- Technology Demonstrator?
- Subcontinent's socio-economic activator?

Thank You!