HIGH – SPEED RAIL CORRIDOR: ROLE OF EXTERNAL ACTORS

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BY

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RESEARCH GUIDE

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Approval of Dissertation

Dissertation entitled High – Speed Rail Corridors: The Role of External Actors by Chitresh Shrivastva, Reg. No. 1657302 is approved for the award of the degree of MA in International Studies

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DECLARATION

I Chitresh Shrivastva hereby declare that the dissertation, titled High – Speed Rail Corridor: The Role of External Actors is a record of original research work undertaken by me for the award of the degree of MA in International Studies. I have completed this study under the supervision of Dr. Anurag Tripathi, Faculty, Department of International Studies.

I also declare that this dissertation has not been submitted for the award of any degree, diploma, associateship, fellowship or other title. It has not been sent for any publication or presentation purpose. I hereby confirm the originality of the work and that there is no plagiarism in any part of the dissertation.

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CERTIFICATE

This is to certify that the dissertation submitted by Chitresh Shrivastva (1657302) titled 'High – Speed Rail Corridor: The Role of External Actors' is a record of research work done by him/her during the academic year 2016-2017 under my supervision in partial fulfilment for the award of Master of Arts in International Studies

This dissertation has not been submitted for the award of any degree, diploma, associateship, fellowship or other title. It has not been sent for any publication or presentation purpose. I hereby confirm the originality of the work and that there is no plagiarism in any part of the dissertation.

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ABSTRACT

High – Speed Railway has a history, which is 84 years old. The first high – speed railway rolled out in Japan in the year 1933 in Germany, when the first train ran at a speed of 160 kmph (95 mph) which was later increased to 200 kmph (119 mph). The trend was followed by Japan in 1964 when the Shinkansen Bullet train made its maiden journey from Tokyo to Osaka at a speed of 300kmph (178 mph). When we look at the Indian scenario, post 1955, when the speed of the trains was restricted to 80kmph. The first Rajdhani between New Delhi and Howrah flagged off in 1969 ran at a speed of 115kmph (68 mph). This was the first milestone achieved by India in progressing towards High – Speed travel further progressing to 120kmph (71 mph) in 1972, with the Rajdhani introduced between Mumbai and New Delhi, post speed increment in 1971.

With the ministry introducing the first air – conditioned intercity train, later known by the name of Shatabdi in 1988, between New Delhi and Jhansi, with an operating speed of 130 kmph (77 mph). Coming of High – Speed rail was also an indication of the paradigm shift in British Era signalling and communication system systems. The Japanese Bullet Train saw the advent of features like Automatic Train Control (ATC), Centralised Traffic Control, shorter train lengths and ballastless tracks.

But, when India is to be analysed in terms of the current European standards, we have been lagging behind the other High – Speed Nations like Germany, America, China, France, United Kingdom, Spain, etc., High – Speed Railway according to the International Union of Railways refers to trains, which operate at speeds of more than 250 kmph (148 mph), while the superfast trains have an operating speed of 160kmph (95mph). However, the speeds vary from country to country based on the nature of the landscape, track type, rolling stock and locomotives. Today, High Speed Railways extends over a network of 29.792 km across countries like Japan, China and France to name a few. A total number of 1,600 million passengers are carried by High Speed Railways across the world India has of recent entered into the field of High Speed Rail, ever since in 2008, during the United Progressive Alliance regime, the government proposed to operate bullet trains. This ambitious project has gained momentum post the coming of National Democratic Alliance. The coming of High Speed Railway in India will enable in cutting dependence of diesel fuel and pacing up the rate of electrification, this would help in the upgradation of the existing speeds of trains and saving of time. High – Speed Rail is also economically and environmentally beneficial, as they are completely electrified and don’t rely on fossil fuels. Indian Railways consumes 2.6 billion litres of diesel annually with 8000 diesel locomotives.

Indian government has shown interest in establishing a robust High – Speed Railway Network, which will be termed as referred to as the Golden Quadrilateral, connecting the four corners. India has signed an MoU with Japan for Technology Transfer of High Speed Railways. India had also signed a Memorandum of Understanding with Alstom in 1995 for technology transfer agreement. The ALSTOM – LHB Coaches, are light – weight and possess the capacity to achieve speeds of 200 kmph, though the present speed of LHB coaches is sanctioned for 160kmph in the case of Gatimaan Express and is further set to increase its maximum speed of 200 kmph with the introduction of Semi – High Speed variant – Tejas. Apart from Japan and France, India has also signed agreements with Austria, Switzerland and USA.

Currently, India concluded the successful trial of Talgo Coaches, which have been designed by Spain and this has also led to increase in Talgo's interest in setting up a High – Speed Train manufacturing facility in India. But understanding is not the only tool to establish High – Speed Rail. This also requires co – operation from financial institutions like Japan International Cooperation Agency and World Bank to provide the much-needed financial assistance. Apart from Japan International Cooperation Agency, the World Bank will provide a financial assistance of `5 Lakh Crores and also assist the railways in Strategic Planning, Digitization, Technological Development and setting up of Railway University and Railway Tariff Authority. The bank will also perform advisory functions and act as a consultant for programme management for the transformation, which would take 2 – 3 years. Our immediate neighbour China also acts as a source of information for understanding the construction of railways in various climatic and tropical conditions. This has led to rivalry between China and Japan to compete against each other for the High – Speed corridor.

India has signed an MoU with Japan for Technology Transfer of High Speed Railways. The estimated cost of the project is expected to be approximately ₹90,000 crores. The anticipated cost of track laying is between ₹100 – 200 crores per kilometre in comparison to the conventional track construction which costs ₹3 - ₹10 crores a kilometre and each trainset would cost ₹120 crore. The project will be executed on a cost sharing basis, with JICA (Japan International Co-operation Agency) providing funds at an interest rate of 0.3% and 81% of the financing being done by Japan. Besides, Japan has also been instrumental in helping India execute the Dedicated Freight Corridor which is scheduled to be completed by the end of 2017.

Keywords: High – Speed Rail, Corridor, External, Actors

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CONTENTS

CHAPTER 1
INTRODUCTION

High – Speed Railway has a history, which is 84 years old. The first high – speed railway rolled out in Japan in the year 1933 in Germany, when the first train ran at a speed of 160 kmph (95 mph) which was later increased to 200 kmph (119 mph). The trend was followed by Japan in 1964 when the Shinkansen Bullet train made its maiden journey from Tokyo to Osaka at a speed of 300kmph (178 mph). When we look at the Indian scenario, post 1955, when the speed of the trains was restricted to 80kmph. The first Rajdhani between New Delhi and Howrah flagged off in 1969 ran at a speed of 115kmph (68 mph). This was the first milestone achieved by India in progressing towards High – Speed travel further progressing to 120kmph (71 mph) in 1972, with the Rajdhani introduced between Mumbai and New Delhi, post speed increment in 1971. (IRFCA:2014)

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project has gained momentum post the coming of National Democratic Alliance. The coming of High Speed Railway in India will enable in cutting dependence of diesel fuel and pacing up the rate of electrification, this would help in the upgradation of the existing speeds of trains and saving of time. High – Speed Rail is also economically and environmentally beneficial, as they are completely electrified and don't rely on fossil fuels. Indian Railways consumes 2.6 billion litres of diesel annually with 8000 diesel locomotives. (PTI:2017)

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India has signed an MoU with Japan for Technology Transfer of High Speed Railways. The estimated cost of the project is expected to be approximately ₹90,000 crores. The anticipated cost of track laying is between ₹100 – 200 crores per kilometre in comparison to the conventional track construction which costs ₹3 - ₹10 crores a kilometre and each trainset would cost ₹120 crore. The

project will be executed on a cost sharing basis, with JICA (Japan International Co-operation Agency) providing funds at an interest rate of 0.3% and 81% of the financing being done by Japan. Besides, Japan has also been instrumental in helping India execute the Dedicated Freight Corridor which is scheduled to be completed by the end of 2017.

STATEMENT OF PROBLEM

Indian Railways as a 163-year-old institution has seen any foreign interventions, the primarily being by the British in establishing workshops, production units, rolling stock and even employees on occasions, who were of European origin. Post-independence, moving towards achieving self – sufficiency in production of Rolling Stock, Locomotives, Signalling and Telecommunications by entering into agreements with Switzerland and USA in the early decades of independence. But, post economic reforms, there has been a paradigm shift in approach towards modernizing the institution and its functioning, with France, Japan, Germany, Spain playing an active role in enhancing their technological partnership with India.

In the light of recent developments, the research aims to trace those strategic partnerships and the present scenario of Indian Railways with its old partners like USA and Switzerland and look into the prospects of High – Speed Rail Corridor and its changing equations with China and Japan with the coming of Diamond Quadrilateral and dwell deeper into the economic costs of High – Speed Corridor and draw comparisons with current infrastructure costs and its implications on the project

The research will further look into the role of International Financial Institutions in supplementing the economic support to Indian Railways which is grappling under a excessive operating ratio of 109% leading to difficulties in covering its variable costs. The research will also draw comparisons and distinctions between Golden and Diamond Quadrilateral to gauge the success of the High – Speed Rail Corridor and analyse railway policies of EU and Chinese and Japanese Rail Diplomacy to understand the High – Speed Rail Model.

OBJECTIVES OF THE STUDY

1. To understand the role of Global Co – operations in the development of Indian Railways
2. To understand the role of International Financial Institutions in providing economic support to the High – Speed Rail Corridor in India
3. To understand the role of Global Technologies as facilitators of High – Speed Rail
4. To understand the challenges posed to High – Speed Rail Corridor from an economic and technical perspective
5. To understand the rivalry amongst nations in the High – Speed Rail Corridor in India

HYPOTHESIS

1. Excessive dependence on External Actors and lack of indigenous development acts as an inhibitor to High – Speed Corridor Project in India

2. Communication gap between Political Machinery and Bureaucracy adds to slow decision making and delayed implementation of High – Speed Corridor Project in India

SCOPE OF STUDY

Post the successful completion of research, the study would be able to:

1. Address the reasons behind India being far behind other countries in terms of train speed
2. The importance of global co – operations in enduring self-sufficiency in the long run on new technologies
3. Understanding the opportunity costs of a High – Speed Rail Corridor
4. Understanding railways as an important diplomatic tool in fostering relations between countries.
5. Role of Special Purpose Vehicles in the implementation of such projects

RESEARCH METHODOLOGY

The research employs Primary and Secondary sources which would comprise of archives from Railways and Government reports and Journal Publications which would analyse the feasibility of High- Speed Corridor in India. The research will also look into the history of High – Speed Railway in India between 1969 and 2014 and try to understand the significance and prospects of interview with experts in the field of railways. The research also intends to trace the history of countries who have invested in the railway infrastructure development in areas such as track, signalling, locomotive and rolling stock and analyse the role of Special Purpose Vehicles and International Financial Organisations in executing such projects.

REVIEW OF LITERATURE

The following sources of data have been identified for the purpose of the study:

1. Takeshita in his article *Criteria for High – Speed Railway Introduction and Application in India* (2012) published by Institution for Transport Policy Studies, Japan examines the construction of High – Speed Rail Corridor from the perspective Per Capita GDP.

2. J, Priyadarshini and M Selladurai. in their article, *A study High Speed Rails in India* (2016) published in International Journal of Trend in Research and Development, Volume 3 (3) talk about the Rail Vision 2020 paper that has been released by the railway ministry. The document stresses on finding solutions to make the journey fast, punctual, clean and convenient one.

3. Raghuram. G and Prashanth D. Udaykumar (2016) in their article, Dedicated High-Speed Rail network in India; Issues in Development published by IIM – Ahmedabad have tried to understand the feasibility of the project by studying the High – Speed rail Networks in the world.

4. Analysis, growth in their report *High – Speed Rail India* (2016) published by Rail Analysis India draw a comparison between the railway networks of India, China and Japan, on the parameters of ownership, the significance of High – Speed Railway network in the economic development of India. The report also focuses on the division of core activities of the railways from the non – core activities and the potential challenges for Japan

5. In a report titled, *Indian Railways – The Turnaround* (2007) published by KPMG there has been an emphasis on the Public Private Partnership taken up by the railways and the creation of Special Purpose Vehicle for faster execution of Railway projects. The High – Speed Rail Corporation is a very good example of SPV created for the purpose of High – Speed Rail Projects.

6. Bhandari, R.R in his book Indian Railways Glorious 150 years (2005) published by the Ministry of Information and Broadcasting, Publication Division. talks about the collaboration with Switzerland, America, Germany for facilitating High – Speed Rail travel through high – powered locomotives and light weight stainless steel coaches like the ALSTOM – LHB coaches.

7. Mishra, R.N in his book Indian Railways turnaround – a study in management (2009) published by Jaico Books has laid emphasis on the capacity augmentation and increment of speeds where he speaks about increasing the average speeds of passenger trains, drawing comparisons with Africa and tracing the history of first high powered locomotive being rolled out in 2002, which improved hauling capacity and speed of trains

8. Chen, Zhenhua. Haynes, Kingsley.E, in their book Chinese Railways in the Era of High Speed (2015) published by Emerald Publishing Group, talk about the High- Speed Railway from the perspectives of Construction, funding, Implementation, Diplomacy and also draw comparisons, with other nations having High – Speed Railway network.

CHAPTER SCHEME

Introduction

The introductory chapter will aim at defining the High-Speed Railway as per the standards of International Union of Railways (UIC) and definition of superfast trains as per European Standards. The Chapter will further go into the history of High- Speed Railway in India in two phases: 1961-1988 and 2004 – 2014

High – Speed Railway Corridor and Rivalry amongst nations

In this chapter, the main aim is to understand the role of Europe and America in the development of Indian Railway infrastructure post 1955 and how the coming of new players such as Spain, Japan and China have led to competition amongst the nations to contribute towards development of High – Speed Rail Corridor in India The chapter will also reflect on the participation of International players in the Suburban Railway Development

Challenges and Prospect of High – Speed Rail Corridor

This chapter emphasizes on the Social, Economic, Political and Technical challenges that are currently being faced in the implementation of the High – Speed Rail Corridor and what are the benefits of having High – Speed Rail Corridors in the long run and its impact on the modernization programme of India n Railways

WHAT IS HIGH – SPEED RAIL CORRIDOR?

Before understanding the High – Speed Rail Corridor, let us try to understand the definition of Rail Corridor. Rail Corridor according to Railsafe is defined in the following manner:

"The land on which a railway is built; comprising all property between property fences, or if no fences, everywhere within 15m from the outermost rails."

The West Virginia Department of Transportation defines Rail Corridors as:

"The path of a railroad right-of-way, including the tracks and a specified tract of land on either side of the tracks (generally fifty to one hundred feet wide)"

From the above definitions, a High – Speed Rail Corridor can be defined as the path of railroad, which is designated to carry traffic at speeds of 160 kmph[1] and above are designated as High – Speed Rail Corridors. Some of the countries having High – Speed Rail Corridor include – Japan, France, United States, Germany, United Kingdom, Uzbekistan, to name a few.

The forging of a strong diplomatic tie between India and Japan, with the proposed High – Speed Rail Corridor between Mumbai and Ahmedabad taking shape. The growing relations between India and Japan with the Shinkansen Technology Transfer facilitating the development of Diamond Quadrilateral connecting the major metropolitan cities, which are presently a part of the Golden Quadrilateral [2]

But this is not the first time India has been a proponent of High – Speed trains. India witnessed the first High – Speed run in 1969 between New Delhi and Howrah by the Rajdhani Express at a maximum speed of 115kmph, which was unheard of at a time, when trains in India ran at a speed of 80kmph. In 1971, the speed of the train through a decision by the Railway Board was increased to 130 kmph, which was followed by introduction of the first Shatabdi in 1988 between New Delhi and Jhansi. India has been in active collaboration with Europe since 1995 when India signed a Memorandum of Understanding with Germany for Technology Transfer of high – speed ALSTOM – LHB coaches, which were rolled out in 2003[3]

Economic conditions also act as major determinants in construction of High – Speed Railways, many European countries, with a GDP between US$15,000 – US$20,000. When we look at the example of Japan and our immediate neighbour China, the two countries started construction before attaining the European GDP levels. Japan's GDP during the 1959 construction of Shinkansen Train network, the GDP stood at US$5,000, which can be inferred as bold move

[1] According to International Union of Railways (UIC), trains with a Maximum Operating Speed of 160kmph are regarded as superfast trains, while trains with a Maximum Operating Speed of 220 kmph are regarded as High – Speed Trains

[2] The Golden Quadrilateral Project was announced in 2002 by Atal Vihari Vajpayee under Rail Vikas Yojna with a total investment of ₹15,000 crores with the aim of strengthening the connectivity between the four metropolitan cities – Bombay, Delhi, Kolkata and Chennai

[3] Germany is now also assisting India in the construction of High – Speed Rail Corridor between Mysuru and Chennai, after involuntary withdrawal of China from the project after the Doklam Standoff

by Japan having a far- sighted vision of the accelerated economic development with the coming of High – Speed Railway Network.

China commenced the construction of High – Speed Railway Network with a GDP of US$3000 on the Qinhuangdao – Shenyang Passenger Railway in 1999. The GDP increased to US$5,000 in 2005, during the construction Beijing – Tianjin Intercity Railway (Takeshita:2012)

At the domestic level of High – Speed Railway Networks, countries like America during the Obama administration in 2009 passed the American Recovery and Reinvestment Act inducing funds worth $US 8 billion, with a minimum investment of $US 1 billion for at least five years devoted to the development of intercity and high – speed with an aim to reduce traffic congestion on roads and conventional railroads, while reducing dependence on fossil fuels. America had kicked off the High – Speed Rail Network Programme earlier than 2009 under the Northeast Corridor Improvement Programme, which aimed at electrification of the Washington – Boston route (Amtrak: 2017)

The development of High – Speed Rail will also envisage the redevelopment of stations and upgradation of existing Rail Corridors, which has been undertaken in partnership with France on the Delhi – Chandigarh route to 200 kmph. On the other hand China through its Belt and Road Initiative plans to expand its High – Speed Rail link upto Kolkata through Myanmar. China has been heavily investing in the promotion of Rail oriented universities in order to enhance the development the railway infrastructure in China

Yet, there do exist challenges at the domestic level as well. Indian Railways has been facing paucity of funds, with increasing variable costs. India has already sought loans from the World Bank of ₹5 Lakh Crores for the development non – core operations of railways of which catering and redevelopment of stations are being taken on a priority basis. A vital question arises – what makes Indian Railway system a lucrative investment hub by the global railway systems? The reasons are twofold. This is to be concerning both internal and external factors responsible for attraction of 100% Foreign Direct Investment in Indian Railways.

When looking at internal factors of railways, Indian Railways being a heavily subsidized public sector serving to the common public, recovers only 57% of the operational costs for trains. Further, being one of the largest utility employer in the world, a major portion of the revenue

generated by the various trains per day is spent on repair and maintenance of fixed assets, workforce, social costs, fuel purchase, etc., [4]

The excessive subsidization leads to underdevelopment of resources due to under investment of the revenues. Further the excessive costs of indigenous development of technology create a favourable condition of investments for global railway powers to inject huge investments, with the aim of not only facilitating the propagation of their technology, but also creates a prospectus for those countries to contribute their inputs in other projects taken by the railways.

A very apt example of this is the role of United States of America, when it first established the first diesel locomotive production unit in 1961 at Varanasi and through the Technology Transfer Agreement manufactured the first high – speed diesel locomotive with air – braking. In the contemporary era, India has shown interest in partnering with countries like France, Switzerland on a much larger scale. With French company Egis looking forward to investing in construction of rail projects, signalling and telecommunication and the urban metro rail systems.

Indian Railways currently needs investments worth 17 trillion dollars to upgrade its current fixed assets crucial to the operation and running of trains on the 1,14,000-km network with 63,000kms of track. The argument put forth in the favour of permitting foreign investments of railways is inability of the railways to cope with the fast-growing demands in the context of the present structure. The high congestion on the exiting corridors, makes it challenging a task for the railways to achieve a sustainable profit for further investments. In such a scenario, induction of foreign investment forms a crucial part of railways bid to be able to compete with the road and air transport. The government has proposed to open FDI route in 17 sectors of Indian Railways attracting a total investment of 90,000 crores in Indian Railways. Some of the sectors earmarked for FDI include, High – Speed Rail, port connectivity and suburban services. The FDI though will be determined by the relation that India shares with the external powers. This also means in the context of the proposed bullet train project between Mumbai and Ahmedabad, the role of Japan International Cooperation Agency will become more prominent, with Japan gaining success in fostering a deal with India over the import of Shinkansen

[4] The railways incur a total expense of 28,000 crores on fuel which includes 17,500 crores on diesel alone. The railways consume 2.2 billion litres of diesel annually and 77,000 crores on operation of passenger trains.

technology into India making it the first country to import the Japanese technology and greater participation of Japanese companies such as Kawasaki Heavy Industries, Hitachi and East Japan Railway Company.

Our immediate neighbour Russia, which has been an ally of India since 1970, has also expressed interest in providing support to India in developing High – Speed Rail Corridor. Russia is amongst the many countries having an expertise in High – Speed. Currently India is looking to Russia's participation in developing semi – high speed corridors of speeds 160 kmph – 200kmph and also in improving safety record of Indian Railways[5]

The ministry has also planned to invest US$ 100 billion in the 3,360km long Dedicated Freight Corridor project and the Delhi – Mumbai Industrial Corridor. So far investments worth ₹40,000 crores have been inducted into the modernisation programme of Indian Railways. This also includes the setting up of an electric locomotive by ALSTOM in Madhepura, Bihar. Alstom has been awarded the contract of manufacturing engines of 12000 HP for improving hauling capacity and train speeds. The programme is set to gain momentum with railways deciding to phase out diesel locomotive in the next five years[6]

Railways has initiated mission Raftaar aimed at improving speeds of trains roping in Hyundai – Rotem, ALSTOM – LHB, with projects worth ₹2500 crores for induction of train sets. Indian Railways aims to induct more trainsets to cut down the travelling time by 20%, which in future might replace Rajdhani and Shatabdi. Through investments in railways, the government plans to facilitate Government to Government interaction. Apart from France, Germany and United Kingdom, the other countries which will be a major participant in the further acceleration of High – Speed Rail Corridor include – Czechoslovakia, United Arab Emirates. (Railways:2017)

Apart from Rolling Stock, track development and Signalling and Telecommunication development, France has also expressed its intention in being a part of the station

[5] 2017. *7O YEARS OF INDIA-RUSSIA: PARTNERSHIP IN THE RAILWAYS.* May 28. Accessed January 28, 2017. http://www.makeinindia.com/article/-/v/70-years-of-india-russia-partnership-in-the-railways.

[6] 2017. *Railways to phase out diesel engines in five years: Piyush Goyal.* November 22. Accessed January 28, 2018. http://www.livemint.com/Industry/4h4UPzZCYwUutVh9j85EwM/Railways-to-phase-out-diesel-engines-in-five-years-Piyush-G.html

redevelopment project, essential to match up with the infrastructure of High – Speed Rail Corridor, in redeveloping the stations of Mumbai and Ludhiana. The high – speed country will also invest US$ 215 million for the purposes of electrification, signalling and telecommunication systems for the Eastern Dedicated Freight Corridor. What acts as a point for correlation between the Diamond Quadrilateral and Dedicated Freight Corridor is the aim of the initiative to augment the speed of the trains.

South Korea also has shown in developing New Delhi Railway Station. Private players like Virgin, a UK based company is looking forward to investing in the High – Speed Rail Corridor. But it is often mistaken for investments by foreign countries only post 1991. It is to be noted that India has had investments being induced from foreign countries since 1955 under the collaboration of the Swiss Car and Elevator Manufacturing Company. The initial capacity of the production unit was 12 coaches under the leadership of Jawaharlal Nehru.

The High-Speed Rail Corridor has on the other hand generated rivalry amongst India's immediate neighbour China and Japan, which is a major contributor to the High – Speed Railway Corridor, one of the highlights being the Mumbai – Ahmedabad Corridor. China on the other hand has newly joined the group of nations who possess High Speed Railway Network in 2011 with a 20,000-km network of High – Speed Railway[7]. Besides High – Speed Rail Corridor, the intervention of external actors will also act as a gateway to improvising safety aspects of railways. In the recent spate of accidents, a team of experts from Japan visited India in order to understand the causes behind the spurt in train accidents. Japan International Cooperation Agency is playing a major role in understanding and studying the current capacity development needs in order to enhance for railway safety.

On the political front, this has generated immense competition amongst the foreign powers who have been involved in the development and modernisation of Indian Railways. A greater look at India's growing ties with Japan on the Shinkansen project, while maintaining a safe distance with China, which has been at loggerheads with India over border disputes, preventing chances of India and China collaborating on the High – Speed project. There was an attempt when India called upon China for carrying out a feasibility study for a high – speed railway connection between Mysore and Chennai. Unfortunately, the Doklam standoff over the Siliguri

[7] For details check Rail Business [FOCUS – INDIA] Volume 2, Issue 9 – July 2011

Corridor hampered the project, with China's withdrawal from the project and the same given to Germany.

There are various determinants, which determine the participation of the countries and the advantages that they enjoy over their partners. France, Germany and Japan, all have high – speed rail corridors. But what holds Japan over other countries, is its expertise in high – speed technology. Japan employs automatic train control system, which is a safety measure, restricting the movement of trains in case of any calamities such as earthquake. Japan is highly prone to earthquakes.

What differentiates Japan's participation from other countries? The fact that Japan has shown a greater interest in the modernisation programme through assistance in the form of Soft loans and also helping India improve its safety system through the participation of Japanese experts. Japan also has been instrumental in not only imparting training to manpower for High – Speed Rail Corridor, but has also been a partner in the development of the first Metro Rail System in India in 1989 when Dr. E. Sreedharan, former chairman of Delhi Metro first visited Tokyo to get the drawings of tunnelling systems for the metro system and has also been instrumental in imparting training to staff of Delhi Metro for the handling of trains.

CHAPTER 2

GROWING GLOBAL INTERESTS IN INDIAN RAILWAYS

High – Speed Railway is a relatively new concept in the Indian scenario in true sense. Although we did achieve success during the 1960s and 80s, when Rajdhani Express was introduced between New Delhi and Howrah in 1969 and between New Delhi and Bombay in 1972 which was just after the Railway Board's decision to increase the speed of Rajdhani from 120 kmph to 130 kmph. (Aggarwal:1988) This was later followed by the introduction of Shatabdi Express in 1988.

While India witnessed paradigm shifts in the field of railway technology post-independence, the participation of more countries in the progress of Indian Railways technically and in terms of infrastructure, led to competition between the nations. The very first time we were provided assistance by an external actor was in 1951 by Switzerland in procuring technologies for production of coaches, much to the efforts of the then transport minister N. Gopala Swamy Iyyengar, the Swiss technology of coach manufacturing which led to the establishment of the first Integral Coach Factory in Chennai marking the end of Indian dependence on Britain for its railway coaches and subsequently we established the Diesel Locomotive Works at Varanasi, under assistance from ALCO (American Locomotive Company) in 1961 and thus continue to build our relations beyond conventional relations through railway as an effective tool of diplomacy.

5.1 TRACING THE HISTORY OF THE FIRST EXTERNAL ASSISTANCE

The first time India got an external assistance from another nation was in 1951, when establishing Integral Coach Factory in Chennai (Then Madras). The idea of setting up a coach factory in India took birth during the visit of B. Venkatraman to the European Railway Congress. While on his visit, when he happened to visit the Schlieren Company to observe the coach building techniques. He therefore made arrangements for apprentices from Indian Railways to be trained in coach manufacturing at the Schlieren and study the technology of coach building.

This, however took time for the plan to take off, till the company was eventually picked up by the railways for the manufacture of coaches under Technology Transfer. A detailed project report was submitted in 1951 for a factory establishment capable of building 300 unfurnished coaches annually. The production unit was eventually inaugurated in 1955 and a technical training school was also established in Perambur a year before in 1954 with a capacity to train around 75 personnel annually on the new technology

With the coming of economic liberalisation and greater opportunities for the participation of nations in the building of the economy, there has been a greater competition amongst the nations to gain grounds in the field of railways especially if we are to look at the point of view of railways, while the dominance of USA continues, we have not just confined ourselves to USA and European powers alone.

Our relation with Japan when it comes to Railway Diplomacy or Train Diplomacy as we would like to term it goes back to the time when India was embarking on the journey to establishing the first metro rail in Kolkata. Dr. E. Sreedharan, regarded as India's metro man visited Japan to seek an insight into the engineering styles and techniques of metro systems way back when the metro project was sanctioned in 1970. The scenario, however is very different from what it was 47 years back. (Aklekar: 2017)

Barring our immediate neighbours like Pakistan and Bangladesh, China has emerged as a global competitor in the region of South Asia with a High – Speed Network of 20,000 kms. If Chinese Railways network is to have witnessed the rapid expansion, it is to owe to the 'China Railway Speed Up Campaign' of 1997. The first High – Speed Railway was introduced in 2004 between Shanghai International Airport and Longyang Road Station of Shanghai Metro. It is to be noted that the High – Speed Railways in China are imported. They have been built under Technology Transfer from train makers like Siemens, Bombardier and Kawasaki Heavy Industries. There are two striking features of the Chinese High – Speed Programme did not segregate itself from the conventional railway system.

Rather the Chinese Railways systematically incorporated even conventional railway systems. The High – Speed Railway was therefore conceptualised as a part of an overall programme which comprised hierarchy of speeds for different part of the railway system. The High – Speed Railway however was not the first attempt of the Chinese to increase the speed of trains. The Chinese government had undertaken a significant programme which laid emphasis on increasing the speeds. This approach is however invoked by Mao Zedong's idea of walking on

two legs, where while one hand China increased the speed of conventional trains from 100 kmph to 160 kmph.

The second aspect of success of China's High-Speed Rail was the cheaper cost of construction of the Chinese Railways in comparison to other countries.

If we are to look deep into the reasons behind China's success in the field of High – Speed Railway when compared to India, is its rightly placed priorities, when coming to investments in the railway network. China invested heavily in developing tracks and coaches and also its in – house capability. This has been possible through the establishment of research institutes focusing on rail transportation.

India on the other hand has not yet exploited its educational institutes or the Standard Organisation of Railways RDSO (Research, Design and Standard Organisation) and is still dependent on the external actors for the development of its technologies. Given the nature of political atmosphere that engulfs the railways, India has been struggling to match up with the global railway systems.

With trainsets growing popularity since 2015 budget announcement, Talgo and CAF from Spain, while Bombardier from Canada, emerged as potential candidates for the bidding process, of which Talgo has had to withdraw owing to technical and bidding issues owing to lack of framework.

On the other hand, Germany has not only emerged as a major player in the rolling stock, but is also carrying out the feasibility study for a High – Speed Corridor between Mysuru and Chennai, the costs of which will be borne by Germany over a year long study which it will be carrying out, after an apparent withdrawal of China from the project following the Doklam Stand – off.

India has also entered into agreements with Alstom for the manufacture of electric locomotives with Alstom, Siemens, GE and Bombardier have been shortlisted to manufacture Electric Locomotives. While Nations like Switzerland, Germany, US have been consistent contributors and less of an aggressive competition has been witnessed, when coming to these nations, the biggest competition is amongst China and Japan, both keen to seize the opportunity to spread their influence into India through the High – Speed Railway Corridor Project of India. The difference that is to be noted here is the management style of both countries railways. While China is a state – owned railway, Japan on the other hand is a private venture that is divided

into seven divisions. There is also a distinction drawn in terms of management. While Operations and Management are unilaterally managed in case of State Owned Railways (E.g. India), there is a line of distinction drawn between Operations and Management department in the case of Private owned railways (E.g. Amtrak, Japanese Railways)

Apart from the production units, Financial institutions also play an important role in the development of Railway infrastructure. When we look at the Indian scenario, two financial institutions – The World Bank and Japan International Cooperation Agency play an important role. High – Speed Corridors will also include the Dedicated Freight Corridor, which aims to decongest the existing networks and enable the smooth flow of freight traffic, with greater hauling capacities and higher speeds of 100 kmph (The current speed of freight trains is 75 kmph). Japan was initially selected as a partner in the development of Dedicated Freight Corridor, but later was phased out of the project. Recently, World Bank provided a loan of ₹5 Lakh Crores for the rehabilitation of core and non – core operations of Indian Railways amongst which Catering and Safety have been given the paramount importance

The Rail War between Japan and China has been going on for a couple of decades now. It is a race to influence a region's policy. The difference also lies in the years of experience with the High – Speed Railway Technology. Post 1933 successful run of German Bullet Train, Japan is the next forerunner of High – Speed Rail Corridor since 1964. Japan has recorded zero fatalities in the past 53 years, while China is a new entrant in the field of High – Speed Railway. China is just six years old when one looks at the track record of the two countries. While China owns expertise in the field of building tracks in the any given topographical condition, Japan on the other hand has expertise in the field of Train Control Technologies such as Automatic Train Control, which enables the train to be controlled via computer and also ensure fail – safe operations in the event of an earthquake.

In the present scenario, Japan has become an influential exporter in the Railroad market and through its financial institution JICA has facilitated building of overseas facilities through commercial aid and technology transfer. The very reason why Japan has been trying to roll out its railway technology in the Asian and Southeast Asian Nations is owing to the decline in demand for railways in Japan against the road and aviation.

The normal Japanese Railway gauge is 1 metre and they run trains upto 160 km per hour speed on metre gauge. For the speed higher than that they adopt standard gauge and speeds upto 350 km per hour have been achieved. Therefore, Japan will not be able to offer the semi high speed trains to Indian Railways. Semi high-speed trains upto maximum speed of 200 kms per hour are very common in England and most of the European countries. These semi high speed rail technologies can be developed in India itself by technology transfers. But our problem is sharp curves on our main routes which will not permit speeds more than 120 kms per hour.

Thus for, countries like India, Japan appears to be an idle participant to the growing need of High – Speed Corridors and Dedicated Freight Corridors, which will lead to the development of Industrial Corridors. Tokyo thus has greater monopoly in terms of High – Speed Rail Technology compared to China or other countries like Germany, Spain, US, etc.,

The advent of High – Speed Railway in India has attracted immense Foreign Direct Investment post the coming of NDA government into power. If we are to compare the amount of foreign investments in the last 17 years, which amounts to $897 million, with $291 million in the form of equity flows between April 2014 and March 2017. The FDI investment since 2014 can be ordered in the following manner:

May 2016: Bombardier, which has been the largest supplier of Rolling Stock has invested USD 100 million in India in the last 20 years and further plans to invest USD 1 billion business in India.

January 2017: Indian Railways proposed to award 6 tenders worth USD 1.2 billion dollars for the setting up of countrywide electricity transmission network in order to reduce electricity bill. The cabinet during this period also circulated a cabinet note for setting up of a dedicated USD 5 billion as Railways of India Development Fund (RIDF)

From the perspective of High – Speed Rail Corridor, there is a growing need for harnessing electric energy, which will also facilitate faster acceleration and deceleration, and improvement in braking systems[8], The railways has therefore proposed to shift to complete electrification by 2022. In the lieu of the proposal, the ministry has approved of Alstom's participation in the

[8] The development of regenerative braking systems for electric locomotives, ensures that the loss of electricity is minimised and the electric is returned back to wires in the process of braking for use by other trains

process. In October 2017, Alstom was given land in Madhepura, Bihar. The electric locomotives will have a total horsepower of 12000 HP over a period of 11 years.

Following is the summary of FDI investments in Indian Railways:

FOREIGN COLLABORATOR	COUNTRY	INDIAN COMPANY	FDI INFLOW (IN USD MILLION)
ALSTOM Transport Holdings B.V.	Netherland	ALSTOM Transport India Ltd	85.20
Bombardier Transportation Holdings	Singapore	Bombardier Transportation India Pvt. Ltd	39.50
Ansaldo STS Australia Pty Ltd	Australia	Ansaldo STS Transportation Systems in India	21.52
GE Capital International	Mauritius	Titagarh Wagons Ltd	14.73
Inversiones EN Concessions	Spain	CAF India Pvt Ltd	11.57

Source: Department of Industrial Policy and Promotion, Ministry of Railways

The coming up of high – speed railway has further given impetus to Research and Development. The Technology Mission on Indian Railways initiated by Indian Railways aims at development/research/ innovation in railway technologies through domestic and international collaboration. At the domestic level, the railways is being assisted by Department of Science and Technology, Ministry of Human Resource Development and representatives of industry

At the international level the ministry of railways has signed MoUs/Protocols during the last two years for technical cooperation in rail sector with the following countries

1. Sweden
2. France
3. Japan
4. Russia
5. United Kingdom
6. Slovak Republic
7. Kazakhstan
8. Canada
9. South Korea
10. China
11. Czech Republic
12. China

The signing of the MoU between Indian Railways and international players will enable the railways to achieve the following objectives:

1. Facilitate technical visits
2. Exchange of technical experts, reports and documents.
3. Exchange of training programme, feasibility studies and pilot projects

CHAPTER 3

CHALLENGES AND PROSPECTS OF HIGH - SPEED CORRIDOR

In order to understand the reasons behind the decline and the possibilities of growth of Indian Railways through the High – Speed Rail Corridor, this chapter will be divided into challenges and prospects. Through history and the future prospectus of Railways, we will try to understand the Social, Economic, Political and Technical challenges and prospects that face the railways in the coming years

4.1 CHALLENGES

Indian Railways in the recent light of accidents highlights an undeniable fact that while opportunities exist, there are more challenges that surround it despite numerous opportunities, given the nature of Railway administration that dominates the affairs of railways and the fragile financial standing of the railways, though it has been comparatively better than the 2001 financial crisis. There exists a huge barrier between the expert recommendations and political willingness to implement the recommendations of the committees over the years.

Indian Railways has been in despair need of rolling stock rehabilitation, new locomotives, immediate maintenance of tracks and bridges, which has been a warning sign for the railways right from the 2002 Rafiganj Train Disaster to 2016 Pukhrayan Train Disaster. A brief overview of railway safety post Fatehpur Train Disaster of 2011, the rising trend in train accidents due to failure of rolling stock, locomotives and tracks is strong evidence to growing negligence of the railways towards the existing infrastructure and excessive emphasis on the increment in the rail traffic, which has led to lesser maintenance time and increased stress on the tracks. The lack of maintenance time was very much evident in the Khatauli Train accident.

A. OPERATIONAL AND TECHNOLOGICAL CHALLENGES

Network and Capacity Augmentation

The network is divided into four categories for better management and operational effectiveness:

1. High Density Corridors
2. Feeder Lines
3. Alternative routes
4. Low traffic density routes

High Density Corridors include the four metropolitan cities of the Golden Quadrilateral viz. Delhi, Kolkata, Chennai and Mumbai, including diagonals. This route carries 55% of passengers 65% of India's total railway traffic. The Broad-Gauge forms 70.7% of the total route. The Golden Quadrilateral forms 15.8% of the total network. There however, exists an excess of 56% of the total freight transport and 47% of the passenger traffic

As per a 2003 report, owing to the saturation of lines at a rate of 120%, thus there is a need for doubling, tripling and quadrupling in different sectors according to the operational requirements along with the construction of railway bypasses in major cities and the upgradation of existing passenger and freight terminals under the Rail Vikas Yojana announced in 2002, where the strengthening of Golden Quadrilateral and its diagonals will cost around ₹8000 crore

The capacity augmentation process is also being undertaken through the process of electrification, which will enable in introduction of modern signalling and telecommunication and will also help in decongesting the route by 15% as per the 2003 estimates of the railway board. The recent announcement by Piyush Goyal led ministry will be discussed in the next section of the chapter.

High – Saturation Rates

Indian Railways unlike Australia or America does not have dedicated lines to run trains. In the Indian scenario, all trains run on the same line, although, it is anticipated that the much-awaited Dedicated Freight Corridor construction which commenced in 2009 is to be completed by 2018. The current saturation rate as estimated in the 2016 budget stands at 180% compared to previous 120%

Train Length and Level Crossings

If we are to achieve higher speeds, the afore mentioned form the first crucial element to achieving the goal. This however is not valid in the case of India. When we look at both the criteria, India fails to meet the criteria. Firstly, the train length exceeds 10 coaches (this is ideal for High – Speed Services) while in India the maximum length for the train is 24 coaches and there are close to 100,000 level crossings, though the railways has paced up its programme to replace level crossings with Overbridges and underbridges. The second concern is the location of homes close to tracks and trespassing of tracks, which is another hindrance for the speed increment.

Signalling and Communication

Indian Railways has still not achieved modern signalling system. Many sections still rely in the British – Era signalling system and the existing Route Relay Interlocking[9] systems prone to technical faults and glitches. In July 2015, a major fire at the Route Relay Interlocking Cabin in Itarsi led to cancellation of 50,000 tickets and a loss of ₹2500 crores. It is just not the fault in the system, but also the financial constraints involved in dealing with glitches of such a magnitude.

[9] Bhandari, R.R, Indian Railways – Glorious 150 years.2005. (New Delhi: Ministry of Broadcasting and Information)

High Technology Costs

Currently, railways is facing challenges in the implementation of existing technology when we look at the ALSTOM Coaches or the implementation of ACD on all the 10,500 locomotives. Post 2010 Santragachi Train Disaster, it was estimated to cost the railways a whopping 16 lakh a locomotive as per reports, while on other hand, the high cost per unit coach anywhere between 75 lakhs – 1.8 crore rupees per coach the current production is at 4000 coaches annually. The railways aim to switch over to ALSTOM by next year, which would lead to an increment in the speeds of the trains.

Subsidies and Variable Costs

Indian Railways is a highly subsidized transport organization. The railways face losses of ₹30,000 crores. A second part includes the variable costs that the railway incurs a bill of ₹28,000 for procuring diesel electricity, with 8000 diesel locomotives and 2500 electric locomotives[10]

The railways further spend 35p on salaries and pensions, further escalating its expenses, adding to subnormal profits and losses in the suburban traffic, the results of which will not be in the favour of Bullet trains, even with 81% of the cost being sponsored by Japan at the lowest interest rate of 0.3% with a grace period of 15 years.

[10] 24 Coaches – www.24coaches.com

DOMESTIC AND INTERNATIONAL PARAMETERS

While there exists a common definition of High – Speed slated by the International Union of Railways (UIC), the parameters for classification of trains as High – Speed is dependent on the local conditions of the country. In the present context, when determining the speed of trains, two very critical factors are taken into due consideration, namely the track and rolling stock. When comparing Indian Railways and Japanese Railways, we can find the following differences, which include as follows:

A. Track

When considering track as one of the many determinants, there exists humungous difference between Indian Railways and Japanese Railways. The Japanese Railways comprises of a standard track measuring 4’8.5” against the multi gauge system of Indian Railways. Since the proposed High – Speed Rail Corridor will be connecting the metropolitan cities, we will consider only the broad gauge, which measures 5’6”. Tracks in Indian Railways vary in terms of their speed and weight

(i) Speed

There is also a great difference in speed on the network of railways on the network of Indian Railways based on the gauge and the topographical conditions and the traffic conditions on the lines. In the current scenario, the multi – gauge system acts as a hindrance to the uniformity of speed. The government therefore introduced the uniguage system in 1992 in order to promote the broad gauge along the entire network of Indian Railways

(ii) Weight

Weight also plays an important role as it enables the stability of train when passing at speed. The speed of the train is inversely proportional to the weight of the track. The weight of the tracks. Currently two types of rails are being used on the Indian Railways, which are of weights: $60kg/m^3$ and $52kg/m^3$ respectively

B. Rolling Stock

Rolling stock again plays an important role in determining the speed of trains. When we look at train sets like the Bullet train, they do not have a separate locomotive for powering the train, whereas when looked at the Indian scenario, not just the separate locomotive and coach arrangement but also the total length of the train plays the spoilsport. The total length of a train in India is 24 coaches in the case of passenger trains across all variants. Secondly, India is still operating the old Swiss Technology coaches for a majority of trains despite having entered into agreements with German company Linke Hoffman Busch or LHB Coaches, which are feasible from the safety point of view and greater speeds. Currently Indian Railways is producing only 4000 coaches on an average. After a spate of train accidents, the ministry has decided to completely phase out ICF coaches by 2017 end completely switch over to LHB coaches.

The switch over is concerned with the rising safety concerns and low speeds of ICF coaches. While ICF coaches can achieve a maximum speed of 130 kmph and are telescopic, LHB have a maximum operating speed of 200kmph with an anti-telescopic feature[11]

[11] Telescopic refers to the feature of one coach climbing upon another in the event of a collision or derailment

Superfast trains as per Indian and International Standards

Given the nature of tracks and rolling stock, the definition for a superfast train also differs across different regions. A superfast train as per UIC definitions is defined as a train which operates at speeds of 160kmph, which is not the case in the Indian scenario. The maximum speed of a superfast train in India has recently been upgraded to 160 kmph with the introduction of Gatimaan Express

4.2 PROSPECTS

Having spoken about the challenges, we now have a look at the prospects of the proposed High-Speed Corridor under the domains as discussed.

A. The Economics of High – Speed Rail

The High – Speed Rail involves high – costs of construction, both internally and externally. On the internal front, the High – Speed Railways would be an attractive substitute to the passengers travelling by road or air. This is clearly evident in the distances over which the High – Speed Rail Projects are being undertaken. On the environment front as well, the project comes as a win – win situation, as it will enable the railways to boost its electrification programme and immensely cut its dependence on Diesel Locomotives. The railway currently faces a combined expenditure of ₹28,000 crores on diesel and electric expenditure.[12] The Railways consumes 300 crore litres of diesel annually, of which every locomotive waste 10 – 25 litres of diesel in the process of idling.

The High – Speed Rail provides an opportunity to switch to a greener source of energy for the railways. It is undeniable that a major part of the electricity produced comes from the thermal plants. Yet, the railways through a complete electrification programme can save the 11,000 crores and channel it to harnessing other sources of energy. In order to manage its energy costs,

[12] According to India today reports, Piyush Goyal has announced complete electrification of the Railway network by 2020 and the phasing out of Diesel Locomotives

the Indian Railways has undertaken a number of initiatives, such as procuring cheaper power, improving the efficiency of power utilization, enhancing its renewable energy capacity and engaging in power trade.[13]

Electrification in Indian Railways has been taken up on a large scale with the following objectives:

1. Increase capacity to meet the growing traffic demand
2. Improve cost effectiveness
3. Utilize energy efficient traction
4. Strengthen the organization in the selected operational areas

However, over the years, the electrification programme was slow to pick up owing to the financial returns that would be earned. In comparison to Diesel traction would have to meet minimum criteria of 14% or above. This takes into consideration the traffic density and the cost of operation by Diesel and Electric Traction. The high cost of generation in the case of Electric traction are also another reason behind the slow momentum of electric traction.

[13] Infrastructure, India. 2017. "Need of the Hour: IR's initiatives to reduce energy consumption." *Indian Infrastructure*, April: 49.

The project has given rise to the development of special institutions for future High – Speed Railway projects, which will help us come on a level playing field with our immediate neighbour China, which already has a 20,000km High – Speed Railway Network. The creation of Rail Vikas Nigam Limited and High – Speed Rail Corporation are an example of the institutions for further development of Railways. The objectives of these institutions are as follows:

1. To undertake feasibility studies and techno – economic investigations and prepare detailed project reports and bankability reports of elected corridors

2. To develop financing models, explore PPP options, coordinate with stake holders and funding agencies and obtain various government approvals.

3. Project development, execution, construction, upgradation, manufacture, operations and maintenance of HSR systems on existing as well as new rail corridors.

   Prior to the Stone foundation being laid, a Memorandum of Understanding was signed between Japan International Cooperation Agency and the Ministry of Railways on October 7,2013 for conducting a joint feasibility study for Mumbai – Ahmedabad High – Speed Rail Corridor. The study was completed in 2015 and approved by the Ministry. The National High -Speed Rail Corporation was incorporated under the ministry on February 12, 2016 to implement the Mumbai – Ahmedabad High Speed Railway Corridor. The cost of the project comes to ₹1,10,000 crores with the cost of per km track laying coming to 217 crore rupees per kilometre. The project is being carried out on a cost sharing basis, where 80% of the project is funded by JICA at an interest rate of 0.1% and the train sets accruing a cost of ₹120 crores.

   India and Japan have also agreed to set up a High – Speed Rail Training Institute in Vadodara. This is also an impetus for the much talked about Make in India project envisioned by Prime Minister Narendra Modi. Apart from Japanese companies like Hitachi and Kawasaki, which have a strong presence in the High – Speed Sector, Indian companies like BHEL are anticipated to enter into a Memorandum of Understanding for the manufacture of High – Speed Rolling Stock.

This would imply, that in the next few years, we would soon be able to achieve self – sufficiency and through technology upgrade be able to indigenously produce High – Speed Train Sets.

The coming of High – Speed Rail to India would also help in boosting Job Opportunities especially in the construction of High – Speed Rail Corridor. People working in the rural sector can work during the lean season in other towns and can get better employment opportunities. More business and Special Economic Zones would get established as the coming of High – Speed Rail Corridors will help in reducing the transport time in souring inputs and speedy distribution of products and also help in boosting tourism, as the stations would further be developed to accommodate malls, cultural centres, theme parks as proposed in the remodelling of stations under the PPP model during the tenure of Suresh Prabhu.

Besides, the High – Speed Rail Corridor, though envisioning the bullet train project, should not merely restrict itself to the strategic Indo – Japan Partnership, but also takes into account the increasing role of Germany, China (Though this has been affected owing to the Doklam standoff between the two countries), France, United Kingdom, etc.,

CHAPTER 4
CONCLUSION

From the previous chapters, what has been seen in common is that the external actors have been actively involved in the revival of rail transportation taking into consideration the state of affairs of developing countries like India. The participation of countries like Spain, Germany, France, Switzerland, US have been over 70 years old. The train diplomacy has been a growing trend with the coming of the NDA government, which is evident by the fact that 100% FDI have been cleared by the cabinet.

High – Speed Railway though is not impossible a dream, but, it is at this juncture a far – fetched idea by the current government. The International Union of Railways defines Superfast trains as trains capable of running at the speed of 160 kmph, which currently the speed of Gatimaan Express, while a major chunk of Indian trains struggle between 110 – 150kmph given the length of our trains, which is 24 coaches for a passenger train compared to the maximum length of High – Speed Trains to be 10 coaches, which apart from multi gauges and speed restriction along different sections of Indian Railways. While High – Speed trains operate in excess of 220 kmph.

It should also be added that we are yet to gain self- sufficiency in production of ALSTOM Coaches introduced way back in 2003, owing to high production costs. Having spoken on the technical feasibility, another domain of contradiction that lies between Indian Railways and Japanese Railways is the nature of top management. While Japan Railways is divided into seven zones and is a private entity, Indian Railways on the other hand is a government entity operating at the central and zonal level with seventeen zones under the vigilance of the ministry.

The railways incur humungous variable costs owing to maintenance of overaged tracks, fuel procurement, water and electricity consumption to name a few. It has been estimated that the railways would need 17 trillion dollars to overhaul its entire network by 2020. This partnership though brings ample opportunities for innovation of railway technology, at the same time it has led to compromise on crucial rail lines and projects, such as the Dedicated Freight Corridor which awaits completion 9 years after the work first commenced.

Indian Railways employs 17 Lakh people and is the ninth largest utility employer in the world. Of the 17 Lakh, 1 Lakh are Loco operating staff or Train engineers. There however remains a disparity amongst the specialisation of drivers or engineers as they are termed in the US. It takes 12 years in the Indian scenario to become a full-fledged driver in the Indian Railways. Besides, in 2011 report by Hindustan Times, a Hindi Daily, exposed to the risky practices adopted by the railways in order to meet the staff crunch, where the drivers specialising in Diesel are shifted to electric locomotive and vice versa, which is a great risk to the smooth running of the trains and the lives of the passengers travelling by them. Post the 2011 Kalka Mail disaster, it was pointed out that close to one lakh safety related posts of Signalman, Pointsman, Gangman, Train Engineers remain vacant. In the light of such instances, the prospects of having a bullet train are remote for the fact, at a time when we are unable to modernize our current training facilities, the setting up of a training school and a longer duration of training would invite further delays to the project.

Indian Railways has been in despair need of rolling stock rehabilitation, new locomotives, immediate maintenance of tracks and bridges, which has been a warning sign for the railways right from the 2002 Rafiganj Train Disaster to 2016 Pukhrayan Train Disaster. A brief overview of railway safety post Fatehpur Train Disaster of 2011, the rising trend in train accidents due to failure of rolling stock, locomotives and tracks is strong evidence to growing negligence of the railways towards the existing infrastructure and excessive emphasis on the increment in the rail traffic, which has led to lesser maintenance time and increased stress on the tracks. The lack of maintenance time was very much evident in the Khatauli Train accident. A more detailed look at the inhibiting factors barring aging assets.

Currently Indian Railways is producing only 4000 coaches on an average. After a spate of train accidents, the ministry has decided to completely phase out ICF coaches by 2017 end completely switch over to LHB coaches

In the year 2000, the Khanna Committee recommended a non – lapsable railway safety fund of ₹17000 crore was created, of which 12000 crores was contributed by the Union Government and 5000 crores was mobilized via safety surcharge. At the moment, the railway seems to be in the midst of excessive dependence on external actors, without due regard for institutions such as RDSO, further adding to the burdens of the railway and communication gap between opinions and decisions further detoriating the plight of the railways.

A closer look at the two reports of the Khakodkar and Pitroda Committee displays the lack of comprehensiveness in the estimates being drawn up. Khakodkar Committee in its list of recommendations does not mention about Human Resources, Organization, Stations or the Dedicated Freight Corridors, while the Pitroda Committee has drawn up an estimate of 1.27 crores for rehabilitation of the stations and 2.4 lakh crores for Dedicated Freight Corridors. Two sectors: Tracks and Bridges and Signalling systems have seen an increase in the investment from Khakodkar to Pitroda committee, which highlights the growing depreciation of assets and the increase in costs for rehabilitation of the fast dwindling assets.

All is not bad, the entry of GE, Alstom, Bombardier MNCs who have long been a contributor to the development of the railways, have revived ties with the railways by entering into the field, augmenting the locomotive production and also contributing to the rehabilitation of essential railway assets such as Rolling Stock and Locomotives.

The much-needed track renewal is growing at a sluggish pace. Suresh Prabhu's budget has had a short-sighted target with just 2,668 km per year. This was again increased to 3,600 kms after the merger of the budget. There needs to be far sighted and sustaining targets for the development of railways. Besides, India should also use this opportunity to understand the best available practices in the field of track laying and also improve the strength of the workforce in order to overcome the staff shortage in crucial departments such as safety if at all India is to progress in the field of Railways.

Lastly, exclusion of conventional lines is by no means a solution to achieving the High – Speed Dream. Rather, Chinese railways should serve as a learning experience for the Indian Railways of striking a balance between the conventional and future High – Speed Railway systems.

APPENDICES

Questionnaire for Dr. E. Sreedharan

1. **Do you think India had a golden opportunity of seeking Japan's help in running Semi High – Speed on the similar lines as Gatimaan? What in your view can be the future challenges posed by the proposed High – Speed Corridor?**

A. The normal Japanese Railway gauge is 1 metre and they run trains upto 160 km per hour speed on metre gauge. For the speed higher than that they adopt standard gauge and speeds upto 350 km per hour have been achieved. Therefore Japan will not be able to offer the semi high speed trains to Indian Railways. Semi high speed trains upto maximum speed of 200 kms per hour are very common in England and most of the European countries. These semi high speed rail technologies can be developed in India itself by technology transfers. But our problem is sharp curves on our main routes which will not permit speeds more than 120 kms per hour.

2. **In the light of recent accidents, how do you gauge the transfer of technology between India and Japan for High Speed Railway? Will it be a compatible means to improve the conventional infrastructure?**

A. The high-speed technology of Japan is upto 350 kms per hour which needs dedicated tracks with very flat curves. This technology is not going to help to improve the Railways conventional infrastructure

3. **What is the potential of some of the 'A' grade routes and the Konkan Railway, which is in my view a role model for development of Semi High – Speed trains? Are they losing out at the cost of the bullet train?**

A. Konkan Railway is unique in the sense it is the only Railway line in this country which has been built with a speed potential of 160 kms per hour. Unfortunately, we don 't has engines and rolling stock capable of running at this speed. So, the potential of Konkan Railway speed of 160 kms per hour is not being availed.

A Grade routes of Indian railways have sharp curves which restrict the speed of trains. Re-aligning of the curves to at least 1000 metres radius is an impossible task with the heavy train services now being carried on these routes. On certain selected sections the curves can be flattened. What is really needed on our existing system is to increase the average speed of trains from the present level of 50 to 55 kms per hour to 80 kms per hour. These lines carry mixed traffic - both freight and passengers. The speed of freight trains is miserably low - average 25 kms per hour. Unless the goods trains are taken out or their average speeds brought to the same level as 80 kms per hour we cannot reduce the travel time. Unfortunately, the maximum speed of goods trains is only 75 kms per hour.

Bullet trains need dedicated tracks and they are not going to in any way eat into the present long-distance passenger traffic volumes.

4. **Do you think the High-Speed Rail Corridor in any way enable regional cooperation amongst the global railway systems? What role do you think India can play in such a situation?**

A. I don't think high speed rail corridors are going to bring in any special regional cooperation. India will not be able to contribute either technologically or financially to other nations in regard to high speed trains

5. **At a time when Dedicated Freight Corridor still awaits completion, do you think that the railways should divert its resources to the High-Speed Rail Corridor? Or should both go hand in hand (The Dedicated Freight Corridor was supposed to be completed by March 2017, but has been further pushed to 2018)**

A. According to me construction of dedicated freight corridor was a miss-adventure. Instead, they should have been made high speed passenger corridors. Then all long-distance passenger trains can be diverted to the new corridor and the released capacity utilized for freight trains. Over the years the freight traffic will come down and the passenger traffic continue to increase. Dedicated freight corridors will financially lead the Railways to a debt trap because the money borrowed has to be paid back which itself is going to be difficult. The shift of freight traffic from Indian railways will make the railways even more financial deficit.

Questionnaire for Mr. Venkateswaran Anand

1. **India and Japan have jointly announced to commence work on the much-talked High – Speed Rail Corridor between Mumbai and Ahmedabad. Do you think that the participation of Japan in the rehabilitation of the existing railway network in terms of safety and operations? (Recently, a team from Japan had come to investigate into the causes of Kalinga Utkal Express accident near Muzaffarnagar)**

A. As far as I know, Japan is not participating in rehabilitation of existing infrastructure. The thrust is on track renewals which require inputs in terms of steel rails, elastic rail fasteners, sleepers, rubber pads, liners, reinforced concrete sleepers, ballast etc. All these items are readily available in India. For the immediate present, such material has been diverted from new construction sites. Rails are in short supply and may have to be imported.

I am not aware of any Japanese experts investigating the Kalinga Express derailment.

The HSR project is a win –win situation because India will acquire the latest technology at a low price. The project is funded by JICA (please see their website) at a very low interest. This will boost export of Japanese equipment.

The entire project is a standalone scheme and has nothing to do with Indian Railways. A separate corporation has been set up called NHSRCL (please visit their website)

2. **Do you think this project will also prove as a catalyst for the ongoing electrification programme announced by Piyush Goyal?**[14]

A. Railway Electrification in an ongoing project which will not be affected in any way by the HSR project.

3. **In the light of the circumstances in the present context, do you think that the railways should invest more in the field of existing technologies such as LHB coaches**[15]**, which are comparatively cheaper and provide both Speed and Safety and therefore start with Semi High – Speed Corridors rather than directly with the HSR considering a humongous cost and the fluctuating nature of the Indian Rupee?**

A. There are two programmes underway. One is the HSR, aiming for 300km/h + on specially built dedicated tracks, which will in all probability be 1435 mm gauge. NHSRCL will build and operate these corridors, of which Mumbai Ahmedabad will be the first. German aid may be available for Chennai-Bengaluru HSR.

The other scheme is to run trains at higher speeds on existing tracks. The aim is 160-200 km/h. This will be done by the Indian Railways with assistance from China, Spain, France and Japan.

This will need upgradation of track, rolling stock (locomotives and passenger coaches), signals and information technology.

In short, the HSRs are standalone projects built owned and operated by the NHSRCL whereas the so called semi high-speed lines will be managed by Indian Railways

[14] According to India today reports, Piyush Goyal has announced complete electrification of the Railway network by 2020 and the phasing out of Diesel Locomotives

[15] The LHB Coaches cost between ₹75 lakhs to 1.8 crores compared to Bullet Train Sets which are estimated to cost ₹120 crores

4. **Will the growing influence of Japan in the growing field of Railway Technology have any effect on India's existing collaborations with countries like France, Germany, USA, etc.?**

A. No. India has been obtaining technology transfer from Japan, USA, Germany, France for nearly seventy years. Many of these projects including the building of metros, has been funded by World Bank, JICA and other agencies. With a resurgent economy and sufficient foreign exchange India is in a position to import the latest and the best in equipment and technology.

5. **Apart from paradigm Technology shifts, will the coming of the High – Speed Rail in India also be an indicator of the shifting in the working style of railway bureaucracy?**

A. The Indian Railways is run by the Central Government. Till recently it was the only department which was running at a profit while meeting its corporate social responsibilities. However, the public looks at the railways through the narrow window of passenger services. This is only the tip of the iceberg. If you go through Indian Railway's Year Book (available on line) you will notice the steady improvement in efficiency. In the last couple of years, serious attempts have been made to de centralise powers and speed up decision making.

LIST OF TABLES

Table 1. Global High-Speed Railway Networks (in km)

Country	In Operation	Under Construction	Total
China	19000	12000	31000
Spain	3100	1800	4900
Japan	2664	782	3446
France	2036	757	2793
Turkey	1420	1506	2926
Germany	1334	428	1762
Italy	923	395	1318
Russia	649	770	1419
South Korea	412	562	974
Taiwan	345	0	345
Uzbekistan	344	0	344
Belgium	209	0	209
Netherlands	120	0	120
United Kingdom	113	204	317
Total	**32669**	**19204**	**51873**

Source: IIM, Ahmedabad (As in April 2015)

Table 1.1: Number of Passengers carried by Global High – Speed Railway Networks

Country	No. of Passengers (in millions)
China	800
Japan	355
France	130
Rest of the World	**315**

Source: UIC (International Union of Railways)

Table 1.2: Share of High - Speed Railway Networks by Countries

Country	Percentage of High – Speed Railway Network
China	59.77
Spain	9.46
Japan	6.64
Turkey	5.64
France	5.38
Germany	3.40
Others	9.71

Source: IIM, Ahmedabad (As in April 2015)

Table 1.3: Countries and their Maximum Operating Speed

Country	Maximum Operating Speed (in kmph)
France	320
Germany	300
Russia	300
Spain	300
Switzerland	250
United Kingdom	360
China	350
India	200
Japan	330
USA	300

Source: International Union of Railways (UIC)

Country	Cost of construction ($million/km)
Europe	25-39
France	24.8-35.2
Spain	27-39
U.S (California)	52
China	17-21
India	33.46

Source: World Bank

High – Speed Rail Projects

Route	Participating companies	Total length
Pune- Mumbai- Ahmedabad	RITES, Systra (France), Italferr (Italy)	650 km
Delhi to Patna (via: Agra, Varanasi, Lucknow)	Mott McDonald (UK)	991 km
Howrah- Haldia	Ineco, Prointec, Ayesa (Spain)	135 km
Hyderabad- Dornakal- Vijayawada-Chennai	Parsons Brickenhoff (India)	664 km
Chennai- Bangalore- Coimbatore- Ernakulum – Thiruvananthapuram	JARTS (Japan Railway Technical Service) and Oriental Consultants	850km

Source: Ministry of Railways

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