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# High-Speed Rail Corridor: The Indian Assessment

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**ABSTRACT**

The Indian High – Speed dream is 85 years old. The dream was first fulfilled by Germany in 1933 after the successful run of the flying Hamburg at 160kmph (99 mph) between Berlin and Hamburg. The speed barrier further broke with the introduction of the Shinkansen Bullet Train between Tokyo and Osaka in 1964 at a Maximum Operating Speed of 320 kmph (198 mph). India made its first attempt to join the consortium of High-Speed Railway System in 1969 with the inauguration of Rajdhani Express between Howrah and New Delhi. Fast forwarding to the contemporary economy, 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. The following paper discusses the projected returns on investment through Cost benefit analysis of the Bullet Train Project

**Keywords:** Rajdhani, Bullet Train, High- Speed, Cost Benefit Analysis, Returns on Investment

## INTRODUCTION

The Indian High-Speed dream is 85 years old. The dream was first fulfilled by Germany in 1933 after the successful run of the flying Hamburg at 160kmph (99 mph) between Berlin and Hamburg. The speed barrier further broke with the introduction of the Shinkansen Bullet Train between Tokyo and Osaka in 1964 at a Maximum Operating Speed of 320 kmph (198 mph). India made its first attempt to join the consortium of High Speed Railway System on 3rd March 1969 with the inauguration of Rajdhani Express between Howrah and New Delhi during the tenure of Ram Subhag Singh as Railway Minister, becoming the first train to be classified as a high-speed train, which had a Maximum Permissible Speed of 115kmph (71 mph) in comparison to 80 kmph (49 mph) of other trains during the period[1].

The Rajdhani[2] was a distinct train in terms of its operating speed of 115 kmph, which was in 1971 increased to 130 kmph under orders issued by the Railway Board proposing the increment of speed

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of Rajdhani. The need for a high-speed train driven by the need of reducing distance between the metro cities with the Indian capital. Most metros are a part of today's golden quadrilateral, which is further proposed to be developed into a diamond quadrilateral[3].

**THE BEGINNING OF A LEGACY**

With the aviation sector reeling under the inception stage, the railway seized the opportunity not just from the perspective of attracting people by assuring reduced travel time, but also signalled change in the way the train fares were determined, with the catering charges being included in the fare and Rajdhani being the first experimental train under this scheme, which was also a contribution from Ratan Chandra, who was the first train attendant, the successful advent of Rajdhani, paved way for faster intercity travel which was started by the name of Shatabdi Express[4] in 1988 between New Delhi and Jhansi with Madhav Rao Scindia as the Railway Minister with a sanctioned speed of 140 kmph (86 mph), with fare structures on the lines of Shatabdi Express.

The Indian high – speed scenario saw diversification post economic reforms, with the focus also shifting to common people, with prices affordable to the working class or the middle class with the introduction of Jan Shatabdi, which was on the lines of Shatabdi, which was regarded as the Jan Shatabdi in 2002 during the Nitish Kumar's ministry. What distinguished the train from the conventional Shatabdi Train was the precedence with regards to operations and the fare structure, with a maximum operating speed of 110 kmph (68 mph), which was succeeded by the introduction of Garib Rath Express in 2005. The coming of every new minister brought along with them a new train, which again was seen in 2009 with the coming of Duronto and Yuva trains with the former aiming at elite passengers, while the latter (Yuva Express) providing fully air – conditioned chair car, affordable travel for unemployed youth or migrant laborers.

While diversifying train services, it is equally important to establish a strong infrastructure, which was realized even before the ambitious diamond quadrilateral was incepted, under the leadership Dr. E. Sreedharan, former member of engineering, Railway Board, marking a paradigm shift in track and bridge engineering.

**SIGNIFICANCE OF INFORMATION TECHNOLOGY**

The route has been developed for fool-proof operations through extensive use of Information Technology and deployment of Anti – Collision Device and Signalling Circuit[5] to prevent any untoward incidents, though it has been partially successful in this attempt. The Konkan Railways in line with Japan's Automatic Train Control, has developed Automatic Train Driving Device. In the face of technical and geographical challenges the project was finally completed in 1998 and dedicated to the nation by former Prime Minister Atal Vihari Vajpayee.

**REGULATION OF FOREIGN INVESTMENTS**

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.

**CONTEMPORARY FOREIGN INVESTMENTS**

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 yearlong 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. 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.

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:

| 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 | Titlagarh 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

**COST-BENEFIT ANALYSIS OF MUMBAI-AHMEDABAD HIGH SPEED RAIL**

The government of India set forth the idea of High-Speed Rail Corridors in 2008, during the tenure of Lalu Prasad Yadav as the Railway Minister. The change in regime in 2014, further catalysed the process with the Honourable Prime Minister Narendra Modi taking personal interest in the establishment of High-Speed Rail Corridor in India after his visit to Japan and his journey on the Shinkansen Bullet Train, regarded as one of the safest train operations, with an accident free record of 62 years, the dream of establishing the High-Speed Rail Corridor spreading over 10,000 kilometres covering the four important points of the Golden Quadrilateral, further upgrading to Diamond Quadrilateral with speeds up to 320kmph (198 mph) for medium distances. In the case of the Mumbai-Ahmedabad Bullet Train Project, the total distance to be covered by the Bullet Train is 508 kilometres, with 12 stops, with a total investment amounting to Rs.90,000 crores INR. As we draw comparison to the conventional railway network, where the per kilometre track laying cost is approximately Rs. 3 Crore INR in comparison to High – Speed Railway Network with 90% elevation, will amount Rs. 100 Crores INR  200 crores INR per kilometre complementing with technical sophistication of assets such as rolling stock which amount to approximately Rs. 125 Crores against Rs.1.8 crore, the cost of an ALSTOM LHB Coach and Rs. 64 Lakhs for an ICF Coach, making it an expensive affair.

Indian Railways being the vehicle of the common public also faces challenge in justifying the social benefits of the bullet train between Mumbai and Ahmedabad, and the anticipated returns on investments, given the wide variation of the Indian Currency. In order to understand the consequences of the anticipated High- Speed Rail Corridor, the research will employ the use of Cost benefit Analysis to understand the various costs, viz. direct and indirect costs involved in the High-Speed Rail construction.

**COST-BENEFIT ANALYSIS**

In order to understand the long-term impact of transport, the cost – benefit analysis forms an important tool to assess the direct and indirect effects of a project in the financial and non-financial viz. Administrative and Technical domains, which are important fields of investment in the case of infrastructure projects.

The process involves synthesis and evaluation of the project to strike a socio – economic balance, which would ensure favourable returns on investment. In the case of Indian Railways, the desired Returns on Investment is slated at 14%. The use of Cost Benefit Analysis can be traced back to 1930, when the American Congress recommended for improvement of inland waterways through constitution of flood disposal systems under the 1936 Flood Control Act. In order to understand the benefits of the proposed High – Speed Rail Corridor the methodology will be employed in the research, which will comprise of the following components:

A. Total Cost
(i) Infrastructure Costs
(ii) Operating Costs
(iii) External Costs

Further in the final step of the method, we shall try to understand the benefit of the project by comparing with the existing railway network in India.

**MUMBAI-AHMEDABAD HIGH SPEED RAIL CORRIDOR**

The Mumbai – Ahmedabad Bullet Train Project is a 530-kilometre project which intends to operate trains at speeds of 320 kilometres per hour (198 miles per hour). The journey currently takes 8 hours by India's fastest intercity train Shatabdi Express at a speed of 145 kilometres per hour (90 miles per hour). The High – Speed Rail Corridor is expected to cut the travel time to 2 hours between the two capital cities.

**DETAILS OF MUMBAI – AHMEDABAD HIGH – SPEED RAILWAY CORRIDOR**

| | |
|---|---|
| Termini | Bandra Kurla Complex – Ahmedabad |
| Intermediate Stations | Bandra Kurla Complex, Thane, Virar, Boisar, Vapi, Bilimora, Surat, Bharuch, Baroda Anand, Sabarmati, Ahmedabad |
| Route length | 530 kilometres |
| Scheduled Train Frequency | 20 minutes |
| Job Opportunity | Approximately 40,000 |
| Ticket Price | 3000 – 5000 rupees approx. |
| Speed | 320 kilometres |
| Estimated Journey Time | 2 hours |
| Maximum Passenger Carrying Capacity | 750 passengers |
| Commencement Date | 15 August 2023 |
| Estimated Completion Date | 15 August 2023 |
| Project Costs | 90,000 crores |
| Carbon Emission | 81,040 tonnes |

**THE COSTS OF A BULLET TRAIN: THE DIMESIONS**

The Infrastructure costs involve a major part of the project. The train set alone will amount anywhere up to 60,000 crore rupees and the permanent way will cost rupees 100 – 200 crores per kilometre as compared to 3 crore rupees for a conventional track, other infrastructure setup comprises of stations, communication lines, signalling and electrification, safety equipment, etc., The operating costs involve three parts, which involve labour and energy costs, energy and other materials consumed by tracks, terminal, traffic management, safety systems, etc., The bullet train on commencement of operation as per RITES would yield an annual revenue of 2,499 crore rupees annually, while the maintenance costs per day would amount to 1.12 crore rupees.

The overall cost annually as maintenance would amount to 412 crore rupees. (RITES: 2013) There however, remains a trace of scepticism on the external costs involved in the project in terms of the environmental impact of the project. One of the challenges to the project is that of Tunnel Boom (Rus: 2008) air pollution and global warming, since the production of electricity is dependent on the use of fossil fuel. 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.[6] 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, 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.[7]

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
5. However, over the years, the electrification programme was slow to pick up owing to the financial returns that would be earned.
6. 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.

**CHALLENGES OF HIGH-SPEED RAILWAY IN INDIA**

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 desperate 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. As of 2018, India recorded 74 accidents, which has been a considerable decrease from the earlier 254 accidents. The railways have currently created a lapsable safety fund to ensure safe operation of trains through the Railway Raksha Kosh amounting Rs. 100,000 crores. Some of the operational and technical challenges are discussed hereunder.

**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. The current golden quadrilateral has been slated to be further upgraded to diamond quadrilateral with the high – speed network measuring 10,000 kilometres in length, with trains operating at speeds of 300 kmph.

**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 2019. The current saturation rate as estimated in the 2016 budget stands at 180% compared to previous 120% in 2003

**Train Length and Level Crossings**

If we are to achieve higher speeds, the aforementioned points 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, which results in speed reduction. The second concern is the location of homes close to tracks and trespassing of tracks, which is another hindrance for the speed increment. The railways has paced up its programme to replace level crossings with Overbridges and underbridges.

**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[8] 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. When compared to the Indian Railways, the Japanese Railways are fully automated, and the trains in Japan are also equipped with automatic earthquake detection system, which halts train operations in situations of earthquakes. The technology upgradation inclusive of infrastructure will cost the Indian railways approximately 17 trillion dollars

**High Technology Costs**

Currently, railways are 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. In comparison to ALSTOM Coaches, the trainsets will cost approximately 125 crores, which is 1.6 times the cost of ALSTOM Coaches, thus posing a challenge to the ambitious goal of High-Speed Rail Corridor

**DOMESTIC AND INTERNATIONAL PARAMETERS**

While there exists a common definition of High-Speed rail proposed 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:

**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. Other characteristics, which act as a possible hindrance to the High – Speed Rail Corridor are the curves on the Indian Railway tracks, which again are a hindrance to the high-speeds. As per the Research Design and Standards Organization, the sanctioned speed for trains on curves is 60 kmph and the track joints also inhibit the speed of trains.

**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 uni-guage system in 1992 in order to promote the broad gauge along the entire network of Indian Railways.

**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.

**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.[9]

**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. Currently, the proposed increment of speeds of trains is slated as follows:

| Train Category | Current Speed | Proposed Speed Increase |
|---|---|---|
| Express/ Passenger | 110 kmph | 130 kmph |
| Rajdhani | 135 kmph | 145 kmph |
| Shatabdi | 145 kmph | 160 kmph |
| Duronto | 130 kmph | 130 kmph |
| Tejas | 130 kmph | 200 kmph |
| Garib Rath | 130 kmph | 130 kmph |
| Freight Train | 75 kmph | 100 kmph |

**CONCLUSION**

Having discussed the various dimensions of costs involved in the construction, and the social and environmental costs that complement with the tangible costs that accompany the project, yet it is to be noted that the Indian government has been making sincere efforts in reinventing Indian Railway network through increase in train speeds as was earlier declared by the Railway Ministry in the year 2016, facilitating reduction in the travel time through High-Speed Rail Corridors and also helping the government cut its expenses on fossil fuels such as diesel, which will also enable greener solution through expansive use of electricity, which would help in improving the acceleration and deceleration of the trains and also be a competitive mode of railway transport, competing against the alternative modes such as air and road, which have been giving stiff competition. The High-Speed Rail Corridor is anticipated to help railways gain the lost ground and also generate revenue for the financially deprived organisation and also help improve the passenger traffic. 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 (136 mph). 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 1.7 million people and is the ninth largest utility employer in the world. It takes 12 years in the Indian scenario to become a full-fledged driver in the Indian Railways. 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 is imperative.

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 Rs.17000 crore (Approx. $2,324,835,000) was created, of which 12000 crores (Approx. $ 1,641,060,000) was contributed by the Union Government and 5000 crores (Approx. $ 683,775,000) 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 (Approx.1.27 billion) for rehabilitation of the stations and 2.4 lakh crores (Approx. $ 32,808,000) 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. 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 (1657 miles). This was again increased to 3,600 kms (2236 miles) 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.

**ENDNOTES**

[1] The speeds of Express/ Superfast trains were increased to 110 kmph (68 mph) in 2004

[2] Rajdhani refers to air – conditioned high – speed train service connecting the state capital to the national capital

[3]Diamond Quadrilateral has been proposed by the present government, which will be 10,000 km High – Speed Rail Corridor

[4]Shatabdi Express refers to air – conditioned high – speed intercity travel connecting the major metros

[5] The signalling circuits used on railways are developed in a manner so as to cause the signal to turn red even by a minor displacement, which might be caused by landslides in the Konkan Region, thus preventing derailments

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

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

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

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

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https://academy.gktoday.in/article/fdi-in-indian-railways/

http://www.makeinindia.com/article/-/v/70-years-of-india-russia-partnership-in-the-railways