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A Study on High Speed Rails in India

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***Abstract*--** In the current scenario, India reaches the world class apparatus and ready to compete with the top leaders of the universe. India succeeds in launching the missiles and satellites, got well trained and unbeatable defence force to protect the nation and holding high class transportation facilities within it. India grown into the prime role of transportation and rail industry is the key point of the Indian transport system. In the field of rail transportation, India got so many experiences while implementing the recent technologies. This articleis going to discuss about the high speed trains in India. This research may relate to the present situation of the high speed trains in the world countries as well as in our nation. The study might include the initiation idea of the high speed rails in India. The estimated stations were selected for the high speed rails and the international countries like Japan, France, Korea, China are showing more interest on funding India to finish the assignment. In this special period Government of India formed a unique department for the high speed railways named High Speed Rail Corporation of India Ltd. This paper concentrates on the development and execution of the planning was established by the government in an effective manner.

***Key words*--** *High Speed Rail, Speed Train, Rail Transport, Train Routes*

I. INTRODUCTION

Indian Railway is the most ancient railway network in India. The first train was operated in the year 1853 from Mumbai to Thane. Bharatiya Rail is the native name of Indian Railways and it was established in April 16, 1853. Indian Railways, becoming one of the largest railway networks in the world. Indian Railways operates lengthy tracks as well as residential rail tracks on the multi gauge networks. Indian Railway functioning in the local lands and also having limited services to Bangladesh, Myanmar, Nepal and Pakistan. Suresh PrabhakarPrabhu is the present-day railway minister since 2014. Indian Railways having fragmented into sixteen zones and they were further sub-divided into sixty eight divisions. Each zone and division having their own zonal headquarter and divisional headquarter respectively.

In recent years, Indian Railways placing so many efforts to initiate some effective promotional schemes in its traditional structure and develop the quality of service. High Speed Rail is the most emerging goal of Indian Railways and it should have a unique network in the field of railway industry. The semi high speed train Gatimaan Express is the most fastest train in our nation in the present situation. Sathabdi, Rajdhani and Duronoto trains are some fast trains in our landmark. Some other trains like Vivek Express is the longest railway line in India runs between Kanyakumari and Dibrugarh; Samjhauta Express is a train that runs between India and Pakistan; Thar Express connecting Khokhrapar (Pakistan) and Munabao (India); Palace on Wheels is an exclusively constructed luxury tourist train service to promote tourism in Rajasthan.

II. REVIEW OF LITERATURE

P. R. Shukla, Minal Pathak et.al (2015), they concludes that the high speed rails may perform a crucial role in retaining and regaining the future share of railway network. They also conveys the unpredictable demand between intercity transport, the presence of several high-density corridors and increasing future incomes, high speed rails makes a comfort platform in India's intercity transport evolution. The improving concentration on high speed rails in India is reflected in the recent policies and budget announced by the Government of India. The analysis highlights the benefits of high speed rails can bring in terms of regional development, and other benefits including improving life style and time saving.

Vijay Kumar Dutt (2016), explains the scenario of bullet rails by cutting down the journey time across the country in an environmental friendly way, this project will allow the original potential of young India and it will be a mile stone in our journey towards emerging progress. By improving Research & Development in this field area, where India has the largest presence in the world, he points that we will be graceful to become complete exporter of innovative rail technology to the world. Bullet trains would provide big boost to Indian Railways with advanced safety, technology transfer, skill development and huge influx of resources.

S. Ramesh, K. Joseph Raj (2014), examines in the financial requirements of the Indian Railways to modernize the infrastructure of the rail industry. It may include the provision of automated signaling system to prevent the crashes. Though,Rajadhani and Shatabdi trains are the fastest and luxurious trains in India. They quotes the other key problem of Indian Railways is the high accident rate, which includes derailment, collisions, many being run over by trains. But the study about bullet trains implementation and avoid these conditions. They were given some ideas and it should be consider while the execution of high speed bullet train.

Shubham Sharma, Annu (2015), they are clearing that India needs to reanalyse its entire railway system before commencing the construction for high speed rail network. A comprehensive plan for the upgradation of existing system is the need of hour. These may include the updating the railway tracks, traction and power systems, rolling stock, signaling and breaking systems, passenger safety, passenger information system, cleanliness and maintenance, disaster management and above all time management. A dedicated track segregated from existing crowded grid with all the new advancements would be the only solution to its structure of Indian railways.

G Raghuram, Prashanth D Udayakumar (2016), they ponders the issues in developing a high speed rail network in India are complex. They figures that India is a developing country, the primary concern is whether the funds for such a project could be better utilised in other domains, including in upgrading conventional rail. However, the Japanese funding to the tune of 80% of the project cost may not be available for other uses.

The complexity of the project also arises due a variety of socio-economic implications like land acquisition, rehabilitation, and environmental concerns. Even though, there are many positive benefits and externalities of the high speed rail which would be useful in India's overall stimulating development. Mumbai-Ahmedabad route is a good choice for the first route, since it connects India's first and seventh most populous cities, with significant economic development in the 500 km corridor between them.

Sunil Kumar Sharma, Anil Kumar (2014), deliberates that India has gained first position as far as travelled passengers per km is concerned but is far behind in the field of latest technology used by other countries such as Japan, UK and US. Vision 2020 proposed by Ministry of Railways, India focuses only on the adoption of mandate technology with high speed rails, but we are still lack behind in the Research and Development of the railway industry. Thus we are experiencing dealt with other countries and importing their own products. Vision 2020 has proposed a good methodology for implementing and expanding the Indian Railways Network.

DhruvSanghvi, H. R. Varia (2013), has reviewed the implementation and adoption of light rail as an alternative mass transit system. Light rail is well suitable for the developed country like US and also for developing country like India. Latest upgraded technology in light rail transit, more passenger's carrying capacity, Eco friendly mode and economical features proves it mandatory option in transportation of Indian era in the present situation. Furthermore, it can reduce the problem of accidents, congestion and fuel consumption. So, Light Rail Transit System seems to be a better solution for most of the transport and traffic related problems in India.

Train Type	Operational Speed	Average Speed
Super Speed	500 – 550 km/hr	450 km/hr
High Speed	250 – 350 km/hr	200 km/hr
Semi-High Speed	160 – 200 km/hr	110 km/hr
Express Trains	120 – 140 km/hr	70 – 90 km/hr
Passenger	90 – 110 km/hr	40 – 60 km/hr

III. GATIMAAN EXPRESS

India's first semi high-speed train service Gatimaan Express tracks between Delhi and Agra. By the month of June 2015 the train was officially announced and numbered as 12049/50. The Gatimaan Express made its maiden journey on April 5, 2016. Gatimaan Express comes under Northern Railway Zone and it starts journey from HazratNizamuddin (New Delhi) to Agra Cantonment railway station and it is a point to point service. The train will take a travel time of 100 minutes to cover 188 kilometres. It operates at a speed of 160 km/h (99 mph) and is the fastest train in India. Excitingly, the present fastest train, Bhopal Shatabdi, takes two hours six minutes to travel the same distance. The train service will be on every day except Friday, because Tajmahal remains closed on Fridays. Gatimaan Express offers executive chair car and air-conditioned chair car classes for its passengers. The fare for Gatimaan Express will be 25% more than what a Shatabdi passenger has to pay. One-way fare of the air-conditioned chair car has been fixed at Rs 690, while a passenger will be required to spend Rs 1,365 for the executive class.

IV. INDIAN RAILWAY VISION 2020

The former railway minister Mamata Banerjee imagined in the month of July 2009 that a document which will capture the Vision 2020 of the Indian Railways. The Vision 2020 covers major strategic of national goals includes comprehensive development in both geographical and social; strengthening national integration; large-scale generation of productive employment and environmental sustainability. It focused to connect the centres of trade and industry, places of pilgrimage, historical locations, and tourist attractions. Railways also must reach the remote and underserved areas of the country to bring them into the national mainstream of development.

Vision 2020 will be radically to find the journey with pleasant-fast, punctual, comfortable, clean, and convenient one. Increasingly, passenger trains must run at high speed in separate corridors throughout the nation. In addition, the Vision 2020 aims at increasing the speed of regular passenger trains in 160-200 km/hr on separated routes which will bring out a major transformation in train travel and that journey will become an overnight service. Vision 2020 also pictures to implement at least 4 high speed rail projects to provide bullet train services at 250-350 km/hr. In these, six corridors have already identified to setup High Speed Rail Corridors follows

1. Delhi-Chandigarh-Amritsar
2. Pune-Mumbai-Ahmedabad
3. Hyderabad-Dornakal-Vijayawada-Chennai
4. Howrah-Haldia
5. Chennai-Bangalore-Coimbatore-Ernakulam
6. Delhi-Agra-Lucknow-Varanasi-Patna

V. HIGH SPEED RAIL CORPORATION

High Speed Rail Corporation of India Limited has been formed on the directions and undertaken of Ministry of Railways, Government of India, for development and implementation of high speed rail projects. High Speed Rail Corporation is an entirely owned subsidiary of Railways construction support Rail Vikas Nigam Limited. It will develop the passenger train services to run at 250-350 km per hour. The current aim is to get the existing trains to achieve semi high speed and clock speed up to 200 km per hour on existing tracks. Mamata Banerjee, the former railway minister announced at the time of 2010-2011 Railway Budget, this company will be entirely different from the Railways Authority of India. High Speed Rail Corporation of India will handle tendering, pre-feasibility studies, granting contracts, and execution of the projects. The corporation was officially formed on October 29, 2013.

Ministry of Railways have now formed National High Speed Rail Corporation Limited (NHSRC) in February, 2016 to implement Mumbai-Ahmedabad High Speed Rail Corridor with Japanese financial and technical assistance.

VI. INDO-JAPAN APEX

India and Japan have signed a Memorandum of Understanding on December 12, 2015 for the collaboration and assistance in the Mumbai-Ahmedabad High Speed Rail Project. The two countries have also entered into two comprehensive technological cooperation agreements on December 11, 2015 for transformation and reconstruction of Indian Railways.These agreements have been signed in the official visit of Mr. Shinzo Abe, the Prime Minister of Japan to India during December 11-13, 2015.

Japan would offers an assistance offifty year loan worth more than Rs79,000 crore for the high speed rail project, with a 15-year grace period atthe interest rate of 0.1%.The Mumbai-Ahmedabad high speed rail project is a 508 kilometre railway track costing a total of Rs. 97,636 crore, to be implemented in a period of seven years. It has been approved that Shinkansen Technology will be adopted for the specific project. Japan will promote India in training theorganizations and employees for high speed rail project.

The main theme of cooperation between India and Japan shall be the development of rail-related recent technical assistance in which the fielders may have mutual interest and performance of consultation and other services. The major parts of technical cooperation may contains the safety in train operation, advanced techniques of maintenance, user friendly and eco-friendly technologies, etc.,

VII. MUMBAI-AHMEDABAD

Mumbai–Ahmadabad high speed rail corridor is a government approved high speed rail corridor project of connecting the cities of Mumbai and Ahmedabad. It will be India's first highspeed railway track, when it trails it first attempt. It was announced a joined high speed railway project of India and Japan in September 2013. This high speed rail project links the locale of Maharashtra and Gujarat in a high-tech way. This track will have 12 stations on its route, in includes 7 stations of Maharashtra and 5 stations of Gujarat. This will be a fully air-conditioned high speed rail are expecting to travel between the stations at speeds of 320 km/hr which will take nearly two hours to cover the two dimensions. At present, the fastest train operating in this line is the Ahmedabad Duronto Express, running between Mumbai Central to Ahmedabad which takes approximately 7 hours and it is a non-stop vehicleruns between these two cities at a maximum speed of 120 km/h.

The feasibilitystudy for Mumbai-Ahmedabad high speedcorridorwas carried out by RITES, Italferr and Systra in July 2015. The study has foundthe high speed rail project is a possible and achievable one.The average constructioncost per kilometre of doubletrack line comes between Rs.76 to 84 crore depending onalignment option.Work on the highspeed rail corridor will start by late 2017 or early 2018 and it is estimated to be complete the project by 2023-24. A 21 km underwater tunnel has been planned between Thane and Virar. It is estimated that land acquisition be completed by 2017. The whole cost of the high speed rail project will be Rs.97,636 crore. Japan has already agreed to assist 81% of the total project cost Rs.79,165 crore, and Indian Railways will contributeRs.9,800 crore.The remaining cost will be borne by the state governments of Maharashtra and Gujarat.

VIII. DIAMOND QUADRILATERAL

The Diamond Quadrilateral is a high speed railway project that connects the four metro cities in India namely Delhi, Mumbai, Chennai and Kolkata. This project is similar to Golden Quadrilateral which is a roadway project which connects the four metros by Express Ways. The Golden Quadrilateral comes under National Highways development project which has helped to build better road transport in India. Similarly to improve country's rail infrastructure there is a need to implement high speed trains. So to fulfill this demand the Diamond Quadrilateral project was planned. India today is planning to start Semi-high speed trains on nine corridors and has ambition to run bullet trains in future. The diamond quadrilateral project will be a demanded and necessitude in the current situation. If the diamond quadrilateral project will get its operation between these metro cities, the Indian economy will reach a higher status in a special way of treatment. The cost budget for the diamond quadrilateral project will be released very shortly and also the work progress will commence soon. The leading countries like Japan, China, France, US are ready to fund the Diamond Quadrilateral high speed rail project.

Our Prime Minister was quoted at registering the support of Japan and China in the high technical railway projects in India. Both Japan and China have the experience and having their own technology to operate high speed trains in their country. High speed trains will be the solution of overcrowding in the highways and slowing the road speeds. But it calls for huge investments and consequently high fares. Additional information quoted in the address relates to 'agri-rail networks' for the quick movement of perishable goods and commodities. In addition to going in for these dedicated corridors and high speed trains, the Indian Railways must get its act together on safety and security on the rails both in terms of technology and human resources.

IX. CHENNAI-DELHI

China records to hold the world's biggest high speed railway network covering 19,000 kilometre and it is longer than all of world's high speed railway lines put together. China is funding and supporting its neighbouring countries, including India, Malaysia, Philippines, Singapore and Indonesia. India already tied up with Japan for its first high speed rail track of 508 km between Mumbai-Ahmedabad. Now China is ready to work with other approved high speed railway routes. It is carrying out feasibility studies for high speed railway lines on the 2,200 km Chennai-New Delhi route and the 1,200 km long New Delhi-Mumbai corridor. The projected Chennai-New Delhi high speed railway corridor will be the second largest high speed railway track in the world, after the 2,298 km long Beijing-Guangzhou line, which was launched three years ago in China.

The corridor is likely to cost Rs. 2 lakh crore and is proposed to be developed jointly with China, home to the world's longest high speed railway line. The Delhi-Chennai corridor is part of Prime Minister NarendraModi's *"Diamond Quadrilateral"* connecting crowning metro cities project has aims to build a network of high speed railway network between different metro cities, including Delhi-Mumbai, Mumbai-Chennai, Chennai-Kolkata, Kolkata-Delhi and Mumbai-Kolkata. India's commitment with China in high speed rail development initiated recently, when the Indian Railways signed a deal with the China Rail Eryuan Engineering Group Company for increasing the speed on Mysore-Bangalore-Chennai railway line.

CONCLUSION

It is the exact time of Indian Railways to meet its technical upgradationand getting its next level infrastructure with high speed rails of India. Even though, it's a critical assignment in developing the high speed rail network in India. India is a developing nation and it has not ready to bear the whole responsible of high speed railways. For those foreign countries like Japan, China, and France are ready to assist India in the high speed railway project. Japan has already funded the 80 per cent of the finance on Mumbai-Ahmedabad high speed railway scheme and also Japan helping India in the technical orientation too. Mumbai-Ahmedabad is the first high speed rail project, and it's a best choice covering 500 km distance. Both the cities are economically well developed and

gains more wealth to the nation. The difficulty of the project may arise in land attainment, reintegration and environmental concerns. The other high speed railway projects should be get charge as soon as possible to develop the intercity network and also it leads the economic boomits nation.

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