Feasibility study of the Indian Bullet Train

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Abstract

The feasibility study done by the Joint Committee has given impetus to the hot topic of Shinkansen Japanese Bullet train to go that extra mile to see that the project is implemented and in turn making a huge capital outlay of Rs 98000 crores. The present study aims at the rationale for the Investment decision to verify that whether the Investment in its true sense an ‘Investment or In-waste-ment’. The study is a further study to the research paper, “Can the Indian Bullet train make the Indian economy run like a bullet” A Study, The earlier paper has already discussed some of the parameters such as the expected time savings, the average paying ability of the paying class, alternative modes of transport such as airways and the comparative cost benefit analysis, the present condition of the Indian Railways, and options regarding its modernization, the present study mainly aims at the additional cost involved in the project and its benefits. The various cost benefits such as employment generation, skill development with the basic objective of improving the standard of living of the average lower and middle class has already been discussed at length in the earlier paper, the present study focuses on the additional burden to both the State Government, the Maharashtra and The Gujarat exchequer if there is a go ahead on the project.

Keywords: Bullet train- Capital Budget- Cost benefit analysis

1. Introduction

The Joint Committee that has made the feasibility study of bringing in the bullet train by the Indian railway since time immemorial has been the subject of discussion. Considering the present condition of the Indian railways, it becomes important to evaluate as to whether it could be a better choice for the modernization of the existing plight of the railways rather than go for bigger investments such as the bullet trains as quoted by the metro man, Hon. E. Shreedharan terming this as the ‘white elephant’. Referring to the article by Mr. Mohan Guruswami which has a similar view that if only a fraction of the much needed funds for building up the infrastructure for the bullet trains be invested in modernization of the Indian Railways by way of rail-network modernization, renovation of coaches that are in bad condition, similar to the steps followed by countries like Japan and China, there could be considerable amount of savings rather than investment in a bullet train in turn terming this as a wasteful expenditure (Guruswamy, 2015).

The present study brings about the various pros and cons of the choice of making such investment visa-vis the modernization of the current bad state of the Indian railways.

Therefore this becomes extremely vital to study for making a comparative cost benefit analysis as regard to the incremental gain that could be generated or otherwise.

2. A snap shot of the current situation as regards to the capital investment of the Indian railways:

A. INFRASTRUCTURE

a. The Indian railways- the third largest railway network in the world
b. 7083 Railway stations
c. 1,31,205 Railway Bridges
d. 9000 locomotives
e. 51030 passenger coaches
f. 219931 freight cars
g. 63,974 routes

B. CURRENT OPERATIONS
a. Currently operates 19,000 trains each day
b. Comprising of 12000 passenger trains
c. 7000 freight trains
d. Transport 2.65 million tonnes of freight traffic
e. 23 million passenger every day
f. 7.2 billion passengers per year
g. Currently has 1.36 million employees
h. Annual Revenue base of about Rs 1,20,000 crore ($ 20 billion)

C. THE DOWNSIDES
a. Typifying the vast, creaking and dilapidated nature of the Infrastructure.
b. Revenue shortage for modernization and safety
c. 7000 freight trains
d. A cash strapped business with consistent recurring losses in the passenger segment of the operation with a loss of Rupees 30,000 crore in the previous year.
e. Loss per passenger- km increased to Rs 0.23
f. Surplus cash of just Rs 690 crore ($ 115 million)
g. Top management severely worried by giving a red signal by hinting at to reduce the expenditure and increase the income with a problem to survive.
h. The present losses curtailed by way of government funding and postponing of vital investments such as filling of tens of thousands of safety related posts like Gang men, Points men, Signal men and Assistant Station masters thereby resulting into burgeoning incidences of railway related accidents and deaths on the rise.

ACCIDENT STATISTICS
a. The year 2000 was earmarked with 89 major accidents and in the year 2010, went down to almost 59 major accidents on account of mainly the insufficient man-power resources.
b. As per the Union Ministry records 25,006 people died, 3882 injured out of the 28,360 railway accidents in India in 2014 alone

The spate of accidents are the offshoot of poor condition of tracks and bridges as revealed by the High level committee in 2012 that was raised as a cause of major concern which also amount to weak tracks slowing down the trains delaying the freight.

As per the Committee's recommendation
a. Modernization of existing tracks comprising nearly 40% of the total network that carries 80% of the traffic.
b. Elimination of level crossings by building rail-over and under-bridges.
c. Provision fencing along side
d. Strengthen 11,250 bridges to sustain higher loads at higher speeds
e. Provide 100% mechanized tracks maintenance on the main routes to allow for superior quality track laying and maintenance

ADDITIONAL INVESTMENTS
Honorable Union Minister of Railways Mr. Suresh Prabhu while providing the progress report on the Indian railways had mentioned the following points
a. Resolved to turn around Indian railways in the year 2014-15
b. Have made a serious effort for mobilizing alternate resources for financing five year investment plan pegged at Rs 8.56 lakh crore with a view to overcoming underinvestment that has plagued infrastructure development on Indian railways.
c. Have raised an annual capital plan to Rs 1 lakh crore (2014-2015) from about Rs 65000 crore, the previous year so that the organization is geared up to perform to its capacity. i.e. additional Rs 35000 crore investment over 2013-2014.

PERFORMANCE OF THE INDIAN RAILWAYS IN 2014-2015
There is an important factor as regards the report that the performance of the railways had improved significantly looking at the 2013-2014 performance. Here are some highlights

Financial Factors
a. The operating ratio has surpassed the Budget estimate target in the year 2014-2015.
b. Passenger earnings grew by 15.5%, Goods earnings by 12.7% respectively in the year 2014-15 as compared to the earlier year.
c. The Indian railways earned Rs 17,234 crore in the year 2014-15 as compared to the earlier year.

**Infrastructure Factors**

a. 723 kms of doubling completed.
b. 1375 electrification route completed
c. 1329 kms of optical fibre cable laid
d. 1983 kms of total lines commissioned.

**PLANS/ACHIEVEMENTS UNDER MAKE IN INDIA PLAN OF THE INDIAN RAILWAYS**

a. 2 Locomotive factories at Madhepura and Marhowrah successfully bid after 7 years for which Rs 3500 crore capital investment was expected in the year 2014-15 through FDI in equity and also an order book of Rs 40,000 crore over next 11 years.
b. 200 Locomotives (9000 HP) being procured for Western Dedicated Freight Carriers costing over Rs 5000 crores that involved setting up of maintenance facility at Rewari was envisaged.
c. Train sets for improving passenger comfort and travel time.
d. Rail Coach factory at Kancharapura was on the anvil.
e. Railway Stations to be redeveloped at various places such as Gandhinagar, Shivajinagar and Surat.
f. More thrust on environmental issues concerning the railways.

**ADDITIONAL DATA FOR BRINGING IN MUMBAI-AHMEDABAD HIGH SPEED RAIL CORRIDOR OF 508 kms**

b. Consultancy firms such as RITES (Rail India Technical Economic Service), ItalFerr( Italian State Railway Group Engineering Firm), Systra (International Engineering and Consultancy Feasibility Study (July 2015) Group).
c. The top speed expected for the corridor was up-to 350 kmpl with an operational speed of 320 kmpl.
d. The line will have 11 stations with proposed stations with Mumbai, Thane, Virar, Dahanu, Valasad, Vapi, Surat, Bharuch, Vadodra, Anand or Nadiad and Ahmedabad
e. The Cost of the study 500 million yen both contributed equally between India and Japan (Sunk Cost- not helpful for decision making)
f. Proposed to originate the corridor at the Bandra Kurla Complex (BKC) in Mumbai
g. Air conditioned Bullet train.
h. Commuters to traverse the 507 kms distance in 2 hours and 7 minutes
i. Currently Ahmedabad from Mumbai Central running nonstop between these two cities at a maximum speed of 120 kmph
j. 20th July 2015, a joint Japanese Indian survey team recommended a Shinkanson style system for the Mumbai Ahmedabad line including the adoption of Automatic train control, dedicated track.
k. The MOU was signed by the Government of India and Japan on 12th December, 2015
l. The Ministry of Railways have taken the decision of go ahead on the high speed train based on the recommendation of NITI Aayog (The National Institution for Transforming India Aayog)
m. The Ministry of Railways fast tracked the project with a set up of a SPV (Special Purpose Vehicle) i.e. NHSRCL – (National High Speed Railway Corporation Ltd.), Date of Registration. – Jan-2016
n. Work on the High speed rail corridor to start by late 2017 or early 2018 and to be completed by 2024-25
o. A 21 km undersea tunnel has been planned between Thane and Virar
p. Land acquisition to be completed by 2017
q. The project is estimated to cost Rs 97636 crore ( USD 15 billion)
r. Japanese to fund 81% of the total project cost (INR 79165) and the remaining cost to be borne jointly by the Govt. of Maharashtra and Gujarat.
s. Interest tenure: 50 years
t. Interest rate 0.1% p.a.
u. 20% of the Components used on the corridor will be supplied by Japan and Manufactured in India under the Make in India campaign.
v. Additional outlay would cost Rs 10,000 crore (USD 1.5 Billion), as the proposal is made to construct the line on an elevated corridor to land acquisition and the need to build underpasses.
w. Trains are proposed to have length of between 10 and 16 coaches
x. Each train will have a passenger capacity of 1300 to 1600 passengers
(Mukul, 2016)

POLITICAL PROBLEM
a. The Indian Railway’s proposal to construct the proposed terminus at BKC (a three storyed underground station) and the Maharashtra State Govt. to plan the construction of the International Financial Service Centre (IFSC) at the same location has created controversies.
b. The State Government is with a view that the IFSC could generate more revenues to the State Government in the near future in contrast to the Bullet train that may complete by 2023 and have suggested to shift the terminus to either Matunga or Kanjurmarg, which may bring about additional cost.

PLANS FOR THE BULLET TRAIN A NEW CHAPTER AS AN ADDITIONAL INVESTMENT A PROHIBITIVE COST?

<table>
<thead>
<tr>
<th>Data</th>
<th>Outlay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total investment required</td>
<td>Rs 98,000 crore</td>
</tr>
<tr>
<td>Loan from Japan (81 %)</td>
<td>Rs 79,380 crore</td>
</tr>
<tr>
<td>India finance (19 %)</td>
<td>Rs 18,620 crore (Land cost Rs 17000 to Rs 18000 crore)</td>
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</tbody>
</table>

Terms of the Agreement

India buys 30 % of equipment including the coaches and locomotives from Japanese firms
In the subsequent years 70-80% of the component could be manufactured in India due to transfer of Japanese technology to India
In view of this the technical support and willingness to drive the manufacturing and technology transfer, initiative would be phased in a specified period
Interest rate to be charged at 0.1 % p.a. with the tenure loan at 50 years and 10-15 year moratorium
Of the total project cost around Rs 17000-18000 crore would be the cost of land

COST BENEFIT ANALYSIS
The study that is based on Capital Budgeting decision captures the following in terms of pure

I. Tangible benefits/outflows
II. Intangible benefits

for the loan amount of Rs 79380 crores

1. Therefore for the first 15 years the interest rate of 0.1 % becomes a cash inflow amounting to Rs 1199.07 crores (working as under)

<table>
<thead>
<tr>
<th>Year</th>
<th>Rupees</th>
<th>Rs</th>
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<td>Value</td>
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<td>B</td>
<td>(A+B)</td>
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<td>15</td>
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</table>

Opportunity gain 1,199.07

2. For the next 35 years the cash outflow would be amounting to Rs 79581 crores (working as under)

35 months x 12= 420 instalments (only the first page and the last page displayed to make the explanation shorter)
The cost of Rs 98000 crore could be recovered in 50 years as under

Data interpretation and analysis is as under
(As per the revised data)
The Bullet train that travels at a speed of 320 kms per hour is a pilot project
<table>
<thead>
<tr>
<th>Month</th>
<th>Principal op.</th>
<th>Interest p.m.</th>
<th>Total amt.</th>
<th>Installment</th>
<th>Closing</th>
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<tr>
<td></td>
<td>Outstanding (a)</td>
<td>(b)</td>
<td>after interest (a+b)</td>
<td>(c)</td>
<td>Outstanding (a+b-c)</td>
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<td>2,691.00</td>
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</table>
The distance from Mumbai to Ahmedabad: 505 kms

As per the revised data the train takes 2 hours and 7 minutes for one oscillation. Thus 127 minutes for one Oscillation from Ahmedabad to Mumbai (With 30 minutes break at the end of each oscillation i.e. 157 minutes for each travel. Thus the train in a day of 1440 minutes will have 9 oscillations.

As per the (revised) data available the train has a capacity to carry 1300 passengers in a single journey. (On the minimum side)

Thus total passengers that can travel in a day are 11,700 (at 100 % capacity)

Assuming that the train travels at 80% capacity the total passengers that could be carried are 9,360 passengers per day

That means if the travel fare per passenger is fixed at Rs 2500 per passenger (On the maximum side)

Therefore 2500 Rs x 9360 = Rs 2.34 crores total collection in 1 single day (1 train)

As for the First 7 years there could be no revenue, that means in 43 years the bullet train would generate 2.34 x 43 x365 days= Rs 36726.3 crores revenue (100 % without breakdowns and maintenance)

Further providing allowances for breakdowns and maintenance of 20% i.e. Rs 36726.3 x 80% would be the revenue generated i.e Rs 29381.04 crores in 43 years (for one train)

As per the information, in order to make this project workable, the bullet train has to have 100 trips. (As per the revised data) Since on an average if the bullet train is making 9 oscillations there should be 11 trains that should be running on the track of Mumbai and Ahmedabad running at 85% capacity passengers i.e. around 1,10,000 passengers per day
That could generate the revenue 110000*2500 per day*30 days= Rs 825 crores in a month
For calculation purpose the Working Capital, and other operating Cost is not considered).
Now the question Can this project be at the top of the priority list??
Additionally the cost could shoot up if the BKC issue is raked up, along with the distance increased of the track.

Observations of the Study:-
The study from the financial angle reveals the following facts (Tangible benefits)
1. In order to recover the cost of interest burden and the principal amount, the train fare has to be hiked which could be brought near to the air fare
2. This gives an impression that the current pricing cannot recover the cost that is involved for investment
3. That means the passenger fare is to be hiked for balancing the equation
4. This in turn would not help a common man.
5. Therefore tangible benefits are on the negative
6. The Political issue as regards the change of the Government in every five years and support from other political parties is also a major issue.

The intangible benefits could be
1. The above cost also involves transfer of technology that can help the skill development of the working class
2. This can boost the employment under Make in India Campaign
3. The depleting agricultural employment could be rejuvenated by generating additional skills as a substitute for raising the standard of living of the poor people of India.
4. Real estate prices could be stabilized due to speedy travel and sufficient balance in economy could be maintained due to options for people to stay in villages far off from their work places.
5. Over a period of time Indians may become habitual to bear the cost of a bullet train, which could become affordable consequently
6. Mutual international business with Japan could give immense learning in many aspects such as education, science and technology from the host country as a path breaking effort for the future development of India and Indian people.
7. The intangible benefits appear to be on the positive side but at what cost??

Significance of the Study:-
Thus the significance of the study can be seen that when the country is mired with other pressing problems, the above proposal cannot be at the top of the list. However the bringing of bullet train is certainly helpful in the long run for India to be in the top list of elite class.
The other factors such as the Union Minister’s current plans of additional investments along with the bullet train cost draws to an inference that there are two economies i.e. one for the poor class and other for the rich class.
This means that the present investment cannot be scrapped for want of bullet trains. So the bullet train will run with a different set of infrastructure along with the old trains running on different platforms.

3. Conclusion
Thus conclusively it is observed that the bullet train is a substitute travel as a replacement for airways. However considering the economy of time and money the air travel is much convenient to the present bullet train.
Interestingly the earlier plan of including Pune and Mumbai fast track was subsequently dropped, which could be a step that is debatable as most people who travel from Pune to Mumbai daily for employment may not get the opportunity to reach home early.

4. Bibliography
Feasibility study of the Indian Bullet Train