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BULLET TRAIN

* Mumbai to Ahmedabad

MGT 609 Project Management Fundamentals

Final Project Report

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**Class Participation Self-Assessment Summary**

|  |  |
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**1. Executive Summary:**

Mumbai and Ahmedabad are two major financial hubs of India. Mumbai to Ahmedabad is one of the busiest route where there is a lot of daily transportation and traffic. The Mumbai-Ahmedabad Bullet Train project will connect seven major cities along western region of India. This project will bring these seven cities closer to Mumbai which is financial capital as well as tourist place of India. This will improve the economy as well as tourism of these cities. The deadline for the project has been set to eight years from now i.e. November 2024 and the estimated budget of completing the project adds up to INR 97,636 crores. The average construction cost per kilometre of double track line comes between INR 76 to 84 crore depending on alignment option. Japan will be contributing to 81% of the total project cost INR 79,165 crores (US $12 billion) through a 50-year loan at an interest rate of 0.1% and a moratorium on repayments up to 15 years. The analyser predict that the loan will be fully repaid in 15 years with interest because lots of passengers would travel through this route. This project will definitely increase the revenue of Indian Government. The goal is to achieve a total speed of 320km/hr to 350 km/hr. The distance covered between Mumbai and Ahmedabad is 534 km. The journey is planned to be completed by bullet train in 2 hrs. The most important thing is complete safety of the passengers travelling in this high speed rail corridor.

Following is the route from Mumbai to Ahmedabad with connecting cities



**2. Project Description:**

**2.1 Description:**

The project will be mainly completed in three different phases. The first phase checks the feasibility of the project. Program delivery team had set meetings with Land and Forest Department of India, where agreements were made. Program delivery team made one MOU (Memorandum of Understanding) with Japan’s International Cooperation Agency (JICA). Finally, Prime minister approved the project after reviewing reports submitted by our organization i.e. program delivery team and government departments. After approval of project, program delivery team will roll out tenders for different sectors of work depending on their priority. The final blueprint will be made after all the tenders are assigned to private companies. Program delivery team will keep meetings between all business heads of winning tenders and higher government departments. Project progress will be made available by weekly and monthly conference meetings. The further plans will be made according to minutes of past meetings.The third and most important phase is the construction which involves the site excavation and preparation, building formation for tracks and platforms. The second part of construction also includes the construction of railway stations, installing signalling systems, laying of rail tracks. The third part includes electric lines and plumbing systems. Our project will keep eye on each activity even after assigning the tenders to private companies.

**Background:**

Everyday a lot of people travel between Mumbai and Ahmedabad. However, the distance between Mumbai and Ahmedabad is 540 km. The traveling time by normal train is around 8-12 hours. Car takes approximately 14 to 16 hours but traffic is one of the biggest constraint which increases the travel time during traffic-jams. Both cities have airports, travelling time is less when people travel through flight. However, the flight fare is so expensive that only elite class can travel through the flight. Also, the Ahmedabad airport is far from the city, and it takes 1-2 hours by car or public transport.  Also passenger often miss the flight because of the traffic issue between Ahmedabad city and airport.

Mumbai to Ahmedabad is a major industrial belt where Vapi, Surat and Vadodara come in route. Surat city is famous for textile and diamond industries. There are lot of manufacturing industries in Vapi. The bullet train project will help people from these cities who travel frequently between Mumbai and Ahmedabad for their business purpose.

**3. Objectives**

The main goal of the bullet train project is to minimize the travel time between two major financial cities. The project is planned to be completed by November 2024.  
This project is the first Fast train (Bullet train )project in India.

**Main Objective:**

To maintain the quality operations between various government departments and private companies (Assigned tender companies).

**Other Objectives:**

|  |  |
| --- | --- |
| Objectives | Measures |
| Approximate distance the train will cover | 540 km |
| The expected operating speed of the train | 320 km/hr (200 mph) |
| Time taken by bullet train from Mumbai to Ahmedabad. | 2 hours |
| The distance between each station on the line | 50-100 km |
| Number of stations on this high-speed bullet train | 7 |
| Bullet ticket fare will be affordable | Rs. 200 to Rs.1000 |
| Two-way rail tracks to avoid the waiting time of train. |  |

**4. Project Scope Statement and Deliverables**

**Who are we?**

In this project we are a program delivery team, we act as liaison between committee and the other departments in the organization. As program delivery we will coordinate tasks between the finance office, legal department, rail operation and maintenance,

The Program delivery team will also be the head of each technical department to oversee technical aspects of the project and report it to the railway board chairman.

The Program Delivery team is responsible for project development, project execution, construction, upgradation, manufacturing, operation and maintenance of the Bullet train.

Program delivery team will assign the tenders to private companies where respective budget will be given by them. Along with huge tenders such as construction, manufacturing and Electric lines program delivery team is also responsible for tendering services such as cleaning services, food services, electrical services, station maintain services, plumbing services etc.

According to the blueprint of the project, Program delivery team will take actions.

**4.1 Business Needs:**

Mumbai and Ahmedabad bullet train project will improve the economy as it is connecting six major cities with Mumbai which is financial capital of India. Also lot of people travel between these routes for business purpose and tourism. The revenue generated by this project will repay the overall loan in fifteen years.

**4.2. Constraints:**

* Budget: The project should not exceed INR 97,636 crores (US$ 15 billion)
* The project should be completed within given deadline.
* Land acquisition: New route is formed for this project. Land acquisition is major problem in our project, but Our organization kept sufficient funds to handle the problems related to land acquisition.
* Environmental: The route is going through some of the forest area. Our organization kept the sufficient funds for compensatory afforestation land.

**4.3. Assumptions:**

* The work assigned to the tenders should be done in an optimum way.
* The trust between helping nations should not break.
* Natural calamities should not take place.
* The political parties and other department should not interfere to stop the project.

**4.4. Exclusions:**

* Construct new railway stations in 7 cities.
* Develop the transportation routes and provide the transportation services from the railway stations to the respective cities.
* Maintain efficient train signalling mechanism with emergency support system to avoid accident.
* Construct 18 bridges and 3 tunnels.
* Construct 10 waiting room at each station which can accommodate 20 people.
* Build 3 parking slots at each station where each slot can accommodate 300 cars.
* Accommodate 5 different kinds of restaurant at each station.
* Provide the Wi-Fi facility at station as well as in train. The speed should be 10mbps
* Three types are compartment in train. i.e. Platinum, Gold and silver. Based upon compartment type, facilities and ticket fare differ from each other.
* 100% availability of assistance within 3 minutes for physically challenged people
* 100% availability of baggage trolleys
* Real time information of each train.
* Online booking facility to avoid the queue to book ticket.
* Provide smart card for frequent passenger.
* Immediate booking seats (8 % Reserve seats) will be available for passenger who make immediate trip plan.
* Security check which will take less than 1 min
* Cover 90% area by CCTV for safety reasons.
* Training for new staff and employees.
* Web and Telephonic customer services for enquiry, feedback, complaints of the passenger.

**5. Project Management Approach**

The project follows an agile approach to management. The project involves three phases.

**Phase 1: Feasibility check**

The phase 1 of the project included defining the business opportunity, identifying a viable for the project and assessing the feasibility. The phase 1 has already been accomplished between Thursday 2/12/09 and Monday 2/1/16. An MOU (Memorandum of Understanding) was signed between JICA and Ministry of Railways on 07.10.2013 for conducting a joint feasibility study for Mumbai - Ahmedabad high speed rail system. Railway Board decided to associate High Speed Rail Corporation of India Ltd (HSRC) in this study. JICA submitted its Final Report of Feasibility Study of this corridor to Ministry of Railways in July 2015.

As part of this project, an assessment was undertaken to see whether or not any land acquisition and/or government land under different tenure system such as forest, village common land will be required for the project and whether or not it will affect the sources of income, livelihood, common and cultural properties on which tribal communities depend. The discussion with Land and Forest Department commenced on 3/12/10 and lasted for 247 days.

The project held its full-fledged meeting at the Railway Ministry to bring about a broad consensus on the project, especially between the governments of Maharashtra and Gujarat, the project was finally approved by Prime Minister Narendra Modi in a meeting with the chairman of the High Speed Rail Corporation of India.

**Phase 2: Tender and Blueprint**

The phase 2 will be run on a proliferated rate starting from Monday 1/2/17. Tenders will be rolled out to private companies. The tender would then be sent for a review. After the review the tender would be awarded to one of these private companies. The final step in this phase would be developing the final blueprint of the entire project.

**Phase 3: Construction**

The Construction phase will be carried out simultaneously in phases. The first part would be the site excavation and preparation, building foundations for the tracks, workshops and platforms at each site.

The second part involves the construction of a 1,200km a high speed rail link. It includes the construction of railway stations, support structures and related infrastructure, the installation of signalling systems and information boards, the laying of rail tracks, construction of beams and trusses.

The third part will be the testing of the entire journey to check the speed of the train and the safety measures taken. Also the electric lines and the plumbing systems will be evaluated for quality checks.

**6. Success Measures**

The Bullet train is a High-Tech Project as most of the technologies employed in this project are new, but some are existent that been developed prior to project initiation.

The measures of success for the Bullet Train project has been divided into four dimensions:

(1) Project Efficiency

(2) Impact on the customer

(3) Benefit to the organization

(4) Preparing for the future

**6.1. Project Efficiency**

The deadline for the project has been set to eight years from now i.e. November 2024 and the estimated budget of completing the project adds up to INR 97,636 crores and the average construction cost per kilometre of double track line comes between INR 76 to 84 crore depending on alignment option. One of the success measures for this project would be the project efficiency that includes this budget and the deadlines. In the end was the project completed by the time it was due i.e. by and the deliverables submitted and completed on time? In the end did the project stick to the budget of Indian Rupees (INR) and were the tracks constructed within the budget of INR 84 crores? Or did the project come in way under budget? The team should always keep track of these things as they decide the efficiency of the project but being a High tech project that affects the common people living in such a huge metropolitan city such as Mumbai and the hub of trades Ahmedabad and as also the Government to some extent, meeting schedule goal or meeting budget goal is trivial to meeting the performance and quality goals as the project is going to be a part of day to day life of one of the stakeholders-the people.

**6.2. Impact on customer**

As mentioned before this is one of the most important success measures for the project as it involves the lives of common people. Any glitches in the performance of the train would not be tolerated and will have a huge impact on the overall running of the project and its future.

**The performance measures would include:**

* Achieve a total speed of 320km/hr to 350 km/hr.
* To cover the distance of 534 km between Mumbai and Ahmedabad in 2 hrs.
* 100% safety of the passengers travelling.
* 100% Punctuality at each of the seven stations included in the path of the train.
* Minimum number of severe, medium or low defects delivered through the lifetime of the project because it indicates the health of the deliverable to the end user and drives the Customer Satisfaction.
* Maintain efficient train signal mechanism with emergency support system to avoid accidents.
* Achieving increased use and frequency of the trains.
* Efficient Web and Telephonic customer services for enquiry, feedback, complaints of the passenger.
* Availability of customer support in case of emergencies or natural catastrophes.
* A high Net Promoter Score (NPS).

**6.3. Benefit to the Organization**

When undertaking this project, we as an organization looked for the prospect of additional profits in the longer run for the Government of India, of increasing market share, and also of gaining the means for additional product lines or technological capabilities. The product line extension would be creating additional corridors from Mumbai to Delhi and so on. Increasing the market share would be measured with the number of people travelling from the Bullet train and establishing a brand name for the Bullet train and the organization. The aim is to repay the amount of loan taken from JICA and gain additional profits after that.

Another way of evaluating the benefit or profits would be by calculating the investment and the benefits. The formula we will be using for evaluating project investment (and project management investment) is Net Benefits divided by Cost. By multiplying this result by 100, this calculation determines the percentage return for every dollar that we invested. The key to this metric is in placing a dollar value on each unit of data that can be collected and used to measure Net Benefits. Sources of benefits can come from a variety of measures, including contribution to profit, savings of costs, increase in quantity of output converted to a rupee value, quality improvements translated into any of the first three measures. Costs might include the costs to design and develop and/or maintain the project or project management improvement initiative, cost of resources, cost of travel and expenses, cost to train, overhead costs, etc. Determining the ROI, EVA and the 10 years’ growth in common equity will also be included as a measure for evaluating the benefits.

**6.4. Preparing for the Future**

This project was initiated for reasons beyond immediate profit. The project does not end here. There are plans for building many such corridors all over India and the extent of joint ventures and strategic alliances to gain competitiveness in these new technologies will be one of the success measures.

**7. Organizational Structure**

The Indian Railways decided to have a special entity formed for this particular project and hence commissioned the National High Speed Rail Corporation of India Ltd (NHSRC). The Organizational structure of the NHSRC is project oriented. The NHSRC is assisted by the Japan International Cooperation Agency (JICA). This Joint Committee has been formed under the Railway Board Chairman along with the secretaries of the Board.

The Project Delivery team is responsible for project development, project execution, construction, upgradation, manufacture, operation and maintenance of the Bullet train. This team is departmentalized into Finance, Legal, Operation and Maintenance and Government Relations. The Operations team further includes Electrical, Construction, Mechanical, Traffic Control and the Railway Police departments.

**Untitled Diagram (1).png**

**8. Managerial Functions**

For a project of this stature, to oversee the operations and technical issues and report it to back to the government there will be a committee which will involve pivotal people from various departments involved such as the head of NITI Aayog (National Institution for Transforming India), Railway board chairman, Secretary of department of Economic Affairs, Secretary of Industrial Policy and Secretary of Foreign Affairs. This is the integration team responsible for ensuring everything falls into place.

**Function of the Head of the committee (Head of NITI Aayog ) will be as follows**

1. Oversee all aspects of the operation.

2. Oversee the funding for the project.

3. Finalise schedule of the project.

**Function of the Railway Board Chairman will be as follows**

1. Oversee all aspects of the operation.

2. Oversee the technical issues related to the project.

**Function of the Secretary of department of Economic Affairs will be as follows**

1. Secure the funding for the operation.

2. Oversee the funding of the operation.

**Function of the Secretary of Foreign Affairs will be as follows**

1. Set the terms related to appointment of general consultant from other country (if required).

2. Set the procurement conditions.

**Function of the Chief Executive Officer will be as follows**

1.     Assist the Board.

2.     Execute the project strategy in an efficient way.

3.     Act as a liaison between the board and management

**Function of the Chief Executive Officer will be as follows**

1.     Assist the Railway Board Chairman.

2.     Purge out the scientific and technological issues arising within the project.

**Function of the Chief Financial Officer will be as follows**

1.     Oversee all financial aspects.

2.     Provide accounting of the budget allocated.

**Function of the Regional Director will be as follows**

1.   They maintain liaison with the respective State Governments and the Central Government in matters relating to the administration of the Transportation Act.

After the committees there will be a head of each technical department to oversee that technical aspect of the project and report it to the railway board chairman.

**Function of the Head Electrical Engineer will be as follows**

1. Oversee all electrical aspects of the operation.

2. Select the technology that will be used in the project.

3. Verify the designs for the trains electrical system (control system, power supplies).

4. Test the design against government safety regulations and set standards.

5. Report it to the Railway Board Chairman.

**Function of the Head Mechanical Engineer will be as follows**

1. Oversee all mechanical aspects of the operation.

2. Select the materials that will be used in the project.

3. Verify the design and structural strength of both track and train.

4. Test the design against government safety regulations and set standards.

5. Report it to the Railway Board Chairman.

**Function of the Head Construction Engineer will be as follows**

1. Oversee all civil aspects of the operation.

2. Select the location for the project.

3. Verify the design of station.

4. Analyse and verify the system against traffic flow and train velocity.

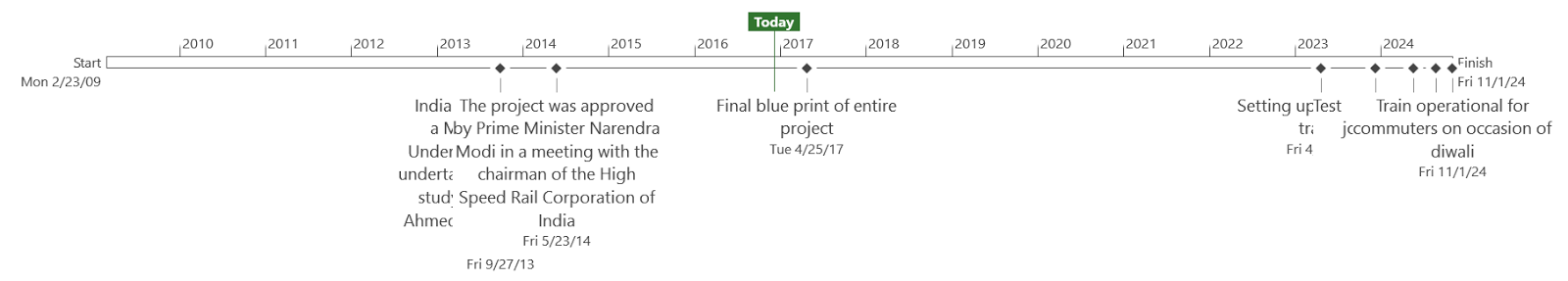
5. Test the design against government safety regulations and set standards.

6. Report it to the Railway Board Chairman.

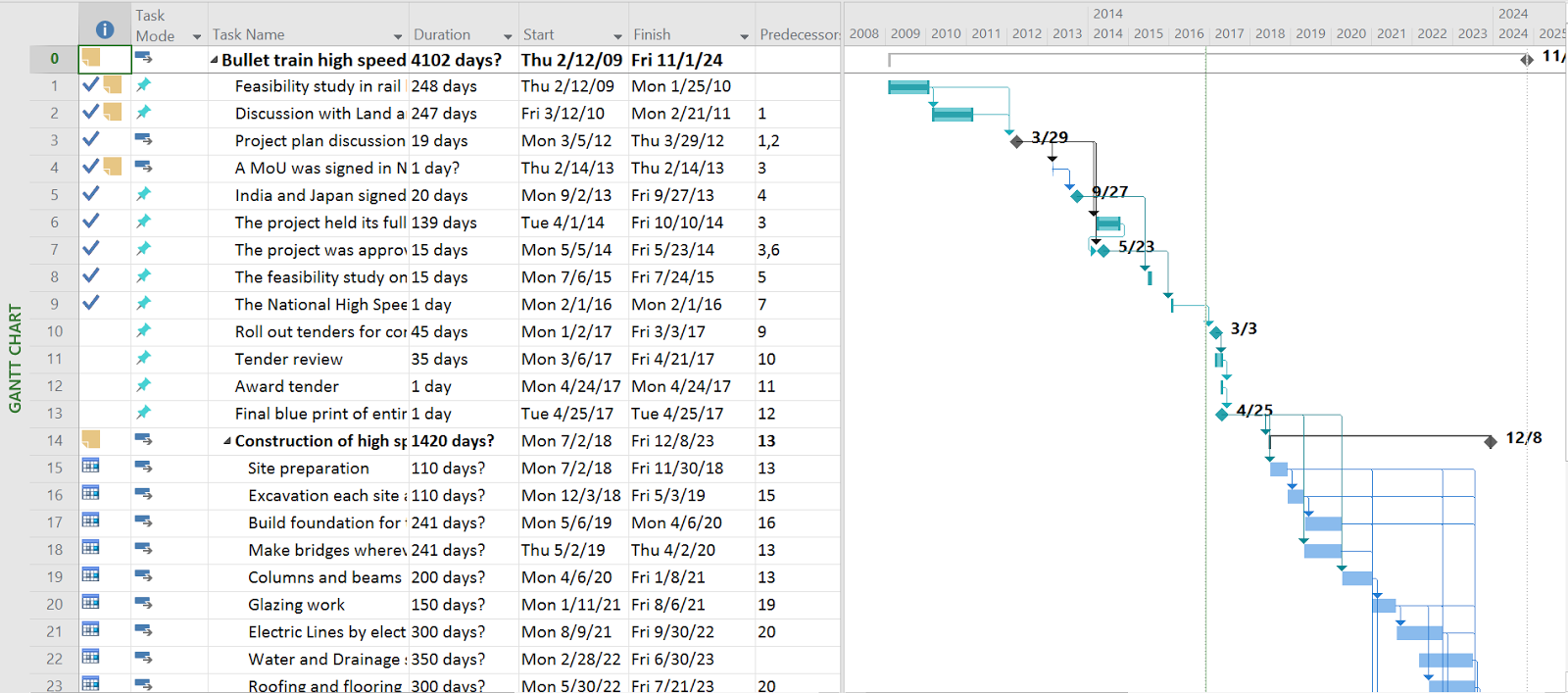
Further down each department there would be teams that would be developing each part of the system, be that selecting materials for the head of mechanical department to verify to designing the control system. Each team will have a head whose main function would be to do the set task and report it to the head of the department.

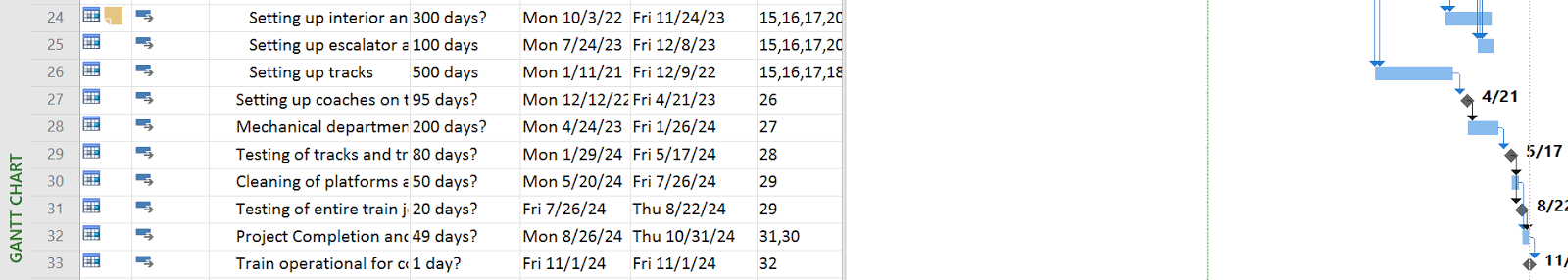
**9. Schedule**

**9.1 Timeline**



**9.2 Gantt Chart**





**10. Major Milestones and Deliverables**

|  |  |
| --- | --- |
| **Year** | **Event** |
| March 2012 | Project plan discussion in ministry |
| September 2013 | India and Japan signed a Memorandum of Understanding (MoU) to undertake a joint feasibility study of the Mumbai-Ahmedabad route in New Delhi |
| May 2014 | The project was approved by Prime Minister Narendra Modi in a meeting with the chairman of the High Speed Rail Corporation of India |
| January 2017 | Roll out tenders for construction, electricity to private companies |
| December 2017 | Final blue print of entire project |
| July 2018 | Construction of high speed rail corridor will start simultaneously in phases |
| December 2022 | Setting up coaches on tracks |
| January 2024 | Testing of tracks and trains and power supply |
| August 2024 | Overall testing of entire train journey |
| November 2024 | Operational for commuters |

**11. Risk Management**

The bullet train project will often be faced with a plethora of challenges of complex nature from financial to technical. Since these projects often involve people from central government, political leaders, regional government, private sector developers and investors it increases the challenges encountered by a project of this bearing. Also sometimes these projects are carried out as a coalition of international treaties which can also pose as a challenge to the project.

The challenges faced by the bullet train project will include

1.     Land acquisition.

2.     Securing funding for the project

3.     Integration with other available modes of transport systems.

4.     Incisive risk allocation

5.     Public acknowledgement

6.     Non-Passenger Revenue

**11.1 Land Acquisition**

Since this project will require the government acquiring the land and displacement of homes from the project underlined areas. It may pose as a difficult risk to encounter depending on the number of homes that are being displaced and relocated. The project will strategically avoid areas where the human displacement costs are quite more than the ordained funding available for displacement of homes. Although the transparent land acquisition laws in India will aid in providing a fair compensation to the parties involved. There has to be a fast land acquisition and relocation process since these two can be one of the many major reasons the project can get delayed.

**11.2 Securing Funding for The Project**

For a project of this stature a feasibility study has to be conducted in order to secure the funding. It will showcase the pragmatic advantages that this project will help bring to provide better service to a large number of people. This is very important, if the project cannot provide services to many people then providing funding to such a project will be a waste. To mitigate this risk, before beginning this bullet train project the government will embrace a feasibility study to understand the financial prerequisites to a greater extent and the risks that project can incorporate financially.

**11.3 Integration with other available modes of transport systems**

Many people in India use trains and buses for their daily commute. Integrating this project with other available modes of transport systems present will only aid in providing better transport services to the people. This will not only provide comfort to public into using the bullet train but executing mix of one mode with different modes will make sure the people are readier to change to public transport from private ones reducing the carbon footprint. Accomplishing this integration is quite difficult and will require acute analysis and time and correspondence within the various people involved with the project.  An analysis and study of other successful integrations worldwide can be carried out for the proper integration of bullet train with other public transport systems. This integration can be carried out by allocating the bullet train path stops in such a way that it coincides with the available transport systems such as the Western Railway Line, BEST bus service, Mumbai Metro service.

**11.4 Incisive risk allocation**

The best way to allocate risk in bullet train project is by sharing the risks involved in the project between the private sector and the government.

The generic risk management process can aid for risk allocation and management in bullet train process. This involves having a detailed description of the risk involved in the process and where it will affect the system the most. Then the next step involves figuring out the source of the risk and what actions or failures will bring the system at risk. Having done this the next step is to figure out the likelihood of the risk occurrence. The final step then involves treating that risk and monitoring the risk. Incisive risk allocation is best done by allotting the risk to the individuals best positioned to manage them. In the bullet train project sharing the risk will prove useful for example if the revenue generated by passengers falls below the prescribed level then the government should aid with revenue support.

**11.5 Public Acceptance**

The bullet train project is a project which would cost the government in thousands of crores and can pose a question to the people as to why the government is better off funding the bullet train project rather than spending money on development of roads, villages, education. Since the bullet train project will lead to land acquisition and relocation of many homes it will be a likely draw a controversy. Thus public acceptance will be a key element here and government should aim to gain public acceptance and support for the project.

**11.6 Non Passenger Revenue**

In this project although the government will aid with revenue support if the revenue falls below the prescribed revenue, the opportunities of generating revenue from variety of sources. This non passenger revenue can be brought from shops selling consumer goods and services at stations, advertisements and media. Generating revenue from numerous sources will only help generate more revenue and will then require less revenue support from the government in case the passenger revenue falls short of the prescribed revenue.

**12. Budget and Cost Control**

The budget estimated for Ahmedabad to Mumbai bullet train is INR 97,636 crores (US$ 15 billion). Japan will be contributing to 81% of the total project cost INR 79,165 crores (US $12 billion) through a 50-year loan at an interest rate of 0.1% and a moratorium on repayments up to 15 years. Indian railways will contribute to INR 9,800 crores (US$ 1.5 billion) in the project and the remaining cost will be borne by Maharashtra and Gujarat state governments. The proposal was to construct the line on an elevated corridor to avoid land acquisitions and the need to build underpasses. This proposal is raise the cost for the project by an additional INR 10,000 crore (US$1.5 billion).The budgets are divided into manufacturing cost, construction cost, ticketing cost, overhead cost, advertising cost, soft cost and labour cost. The estimated budgets are provided respectively in the below table: -

|  |  |  |
| --- | --- | --- |
| Serial  Number | Task | Estimation |
| 1 | Manufacturing Cost | 20636 |
| 1.1 | Engines | 7000 |
| 1.2 | Compartments | 4000 |
| 1.3 | Footboards | 136 |
| 1.4 | Sitting Chairs | 3000 |
| 1.5 | Sitting Chairs for handicapped | 1200 |
| 1.6 | Luggage Compartments | 1200 |
| 1.7 | Pantry Car | 2000 |
| 1.8 | Washrooms | 1000 |
| 1.9 | Charging Boards/switches | 100 |
| 1.10 | Ticket Vending Machines | 1600 |
| 2 | Construction Cost | 30000 |
| 2.1 | Factory Setup | 7000 |
| 2.2 | Stations |  |
| 2.2.1 | Platforms | 1500 |
| 2.2.2 | Ticket counters | 700 |
| 2.2.3 | Waiting Rooms with washrooms | 100 |
| 2.2.4 | Escalators | 350 |
| 2.2.5 | Elevators | 550 |
| 2.2.6 | Luggage Rooms | 100 |
| 2.2.7 | Food courts | 200 |
| 2.2.8 | Railway yard | 2000 |
| 2.2.9 | Parking Space | 500 |
| 2.2.10 | Railway lines on land | 1000 |
| 2.2.11 | Railway lines on flyover | 2200 |
| 2.2.12 | Bridges over water | 2800 |
| 2.2.13 | Bridges over land | 1000 |
| 2.2.14 | Tunnels | 8000 |
| 2.2.15 | Electric Wiring | 1000 |
| 2.2.16 | Plumbing | 1000 |
| 3 | Ticketing Cost | 5000 |
| 3.1 | E-tickets and SMS | 1000 |
| 3.2 | Tickets fare for Senior Citizens | 500 |
| 3.3 | Tickets fare for Adults | 800 |
| 3.4 | Tickets Fare for children below 3 years | 200 |
| 3.5 | Paper cost | 2000 |
| 3.6 | Printing cost | 500 |
| 4 | Overhead Cost | 10000 |
| 4.1 | Electricity Cost at Stations | 1800 |
| 4.2 | HVAC (Train) | 4000 |
| 4.3 | On Board passenger display of next stops (stations) | 1200 |
| 4.4 | CCTV | 2000 |
| 4.5 | Wi-Fi | 1000 |
| 5 | Advertising Cost | 5000 |
| 5.1 | Newspaper Advertising | 1000 |
| 5.2 | Magazine printing | 1500 |
| 5.3 | Poster printing | 1000 |
| 5.4 | Advertisements on Television | 1500 |
| 6 | Soft Cost | 10000 |
| 6.1 | Designing and planning cost | 1000 |
| 6.2 | Inspection cost | 200 |
| 6.3 | Government fees | 500 |
| 6.4 | Insurance | 7000 |
| 6.5 | Railway Tariff setup | 200 |
| 6.6 | Safety Regulatory Setup | 100 |
| 6.7 | Leveraging Technology | 700 |
| 6.8 | Entertainment Cost | 300 |
| 7 | Labor Cost | 15000 |
| 7.1 | Train manufacturing | 3000 |
| 7.2 | Station Construction | 5000 |
| 7.3 | Catering Services | 1000 |
| 7.4 | Ticketing Labor at stations and trains | 2000 |
| 7.5 | Employee wages (salaries) | 2500 |
| 7.6 | Cleaning Labor | 500 |
| 7.7 | Surveillance labour | 1000 |

**13. Process for Project Monitoring, Auditing, Review and Evaluation**

Quality audit is the process of systematic examination of a quality system carried out by an internal or external quality auditor or an audit team. It is an important part of organization's [quality management system](https://en.wikipedia.org/wiki/Quality_management_system) and is a key element in the [ISO](https://en.wikipedia.org/wiki/International_Organization_for_Standardization) quality system standard, [ISO 9001](https://en.wikipedia.org/wiki/ISO_9001). A quality audit is a structured, independent process to determine if project activities comply with organizational and project policies, processes, and procedures. The objectives of a quality audit may include:

* Identify all good and best practises being implemented - The technology being used should be adaptable to the implementation of the bullet train. At the same time, support and maintenance of the technology should be proper.
* Identify all nonconformity, gaps, and shortcomings - The quality of the tracks should be in accordance to the technology used to run bullet trains. The signals used to schedule the train should be as per the speed of the train. The routes for the bullet train should be under strict surveillance so that the schedule of other trains is not hampered.

The subsequent effort to correct any deficiencies should result in a reduced cost of quality and an increase in sponsor or customer acceptance of the project’s product. Quality audits may be scheduled or random, and may be conducted by internal or external auditors. Quality audits can confirm the implementation of approved change requests including updates, corrective actions, defect repairs, and preventive actions.

Project evaluation is a systematic and objective assessment of an ongoing or completed project. The aim is to determine the relevance and level of achievement of project objectives, development effectiveness, efficiency, impact and sustainability. Before the actual project goes live, it is advised to have a test run where in a single engine is run on the tracks and if any issues, they are immediately addressed so that the project on the whole can be effectively implied.

**14. Communication and display of project progress**

Here the communication of project progress takes place between various entity such as government of India, Indian Railway, government of Maharashtra and Gujarat, Japan and the company who will overtake the entire project.

* Publication of sustainability report.
* Regular meeting was organized and will be continued in future throughout the year with different department who are responsible in the project.
* French national railway signed Memorandum of Understanding for technical cooperation in the field of railways. So project progress was also shared to them in assistance with their technical support.
* Japan also signed Memorandum of Understanding to undertake a joint feasibility study of the route.
* Government of Maharashtra and Gujarat had to work hand in hand for development of this project.
* Help should be taken from western railways as they already have routes for normal train.
* Once a company overtakes the entire project, while going through various phases of project they have to report the progress to all the organization linked to the project stated above.
* Committees and workgroups were put in place to ensure close work integration with various departments.
* Several digital and print media can be made available to all employees for getting information on ongoing operations.
* Regular internal and external audits of process and facilities can be conducted to ensure about quality of work done to avoid extra efforts afterwards for repairs.
* Training and workshops will be conducted to different kinds of organization and their employees, business partners to make them aware of necessary information to ensure the bullet train operates as desired.
* Different climatic conditions, atmosphere, temperature, pressure are to measured and information about this should be passed to everyone who are included in the operation.
* Budget changes of railways and economy which takes place in February of every year should be taken care and shared with all managers.
* Annual reporting of overall work should be shared with government of India.

**15. Conflict Management**

Aim of conflict management is basically to enhance the positive aspects of a conflict and reduce the negative aspects of the conflict. In the bullet train project due to the vast number of people at high positions involved there is bound to be conflicts resulting from vested interests. In any project effectiveness and efficiency are two elements very crucial to the project development. Adjustments that can arise to improve the effectiveness of the project will have to properly scrutinized to make sure there is no loss incurred. Since any loss incurred will be in thousands of crores.

In certain situations, where the project has a risk of going off track due to conflicts and a quick resolution is required for the conflict management strategy of forcing can be justifiably used if win-win is ineffective. For example, during integration with other means of transport the head of that department may be unwilling to forego any change say moving a bus stop to a different location so as to facilitate the bullet train users. Forcing that transport head to do so will provide a quick resolution to a conflict.

Land acquisitions and displacements are poised to draw various controversies, managing this conflict would require accommodating the concerns of the people involved or affected. Accommodating will help protect more important interests while giving up on the vestigial ones.

Since the bullet train project is a project connecting two states with a high speed train. There are chances of conflicts arising within the state governments of two states over the areas the project runs through. Collaborating with the state government to find a solution to the conflict will help all the parties involved in the project find a win-win outcome.

**16. Quality issues/ Quality Management**

Quality management ensures that an organization, product or service is consistent. It has four main components: quality planning, quality assurance, quality control and quality improvement. Quality management is focused not only on product and service quality, but also on the means to achieve it. The following are the quality issues that can be faced:

* Stringent deadlines may force quick construction which can turn out to be corrupt - In order to complete the bullet train project within deadlines, it is a tendency to invest less time on work which might require more focus and time. Example: Manufacturing of engine might take 20 days and it is poorly constructed in 5 days. This can lead to hazardous results later on.
* Insufficient budget allocation can lead to inferior quality goods used in manufacturing and construction - Proper distribution of budget and cost should be done so that all phases of the project should be perfectly completed. There should not be any compromise in the quality of the goods used in this project since it can turn out to be harmful for the public safety.
* Insufficient resources can lead to poor quality work output - Sufficient time should be provided for the resources to complete each phase of the project. Example: If construction of tracks would require 10 workers, then one should not expect work to be completed by 2 workers.
* Safety comes before profit - Public safety should come before the monetary profit.
* Adequate measures based on demographics - Few bullet train tracks are constructed through areas which are prone to natural calamities like earthquake and floods. The quality should be maintained so that the train tracks or the train should be able to sustain under these circumstances as well.

**17. References:**

<http://smallbusiness.chron.com/measure-projects-success-44005.html>

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