

# Example of shinkansen network essay

[Transportation](#)



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## **Abstract**

The focus of this research is on the shinkansen and the development of the shinkansen. The paper concentrates on the evolution of transport policies in Japan and what made shinkansen a symbol of modern Japan.

## **Introduction**

Shinkansen Network covers the main islands of Japan and the country's major cities. The bullet trains are known as shinkansen in Japan and are operated by Japan Railways. They run at speeds of up to 320 km/h, and are well known for their punctuality, safety and comfort. Japan Rail Pass makes it very cost effective for the passengers to travel by Shinkansen. Tokaido Shinkansen is the oldest and most popular of the different network of multiple lines that have been exclusively built for these bullet trains. Shinkansen railway system is the leader of the railway technology in the world, ever since it was introduced in 1964 (Takatsu, 2014). Recently, one finds more advanced technologies getting introduced that offer greater safety and more comfortable seats for the passengers. One should make use of the high-speed travel to the destinations of their choice, as well as enjoy punctual departures and save on expenses. The shinkansen project began in 1964 and coincides with the Olympic Games hosting in Tokyo. These events symbolize the beginning of a modern Japan. The Shinkansen project was first abandoned because of the war, even after much of the land was purchased, and the tunnels were made.

## **Transportation policy**

The movement of people and goods is one of the major socioeconomic activities of any nation. National and local governments, concerned institutions and various other organizations are involved in designing and structuring the transportation policy. When formulating transportation policy, one needs to follow the socioeconomic conditions of a given time and keep in mind the challenges that could be the preservation of resources and energy, global warming, comfortable transportation system, etc. There are issues of funding and the increasing inter-regional gap between remote regions and urban centers.

Surveys and research regarding the Transportation policy (Kakumoto, 1987) include safety, comfort and mobility and how the transportation will remain in consistence with environmental, energy, national and regional policy. How the policy will impact businesses, and the movement of people and goods too is important. Passenger transportation has changed in Japan over the decades, and the number of trips as well as the distance traveled per person every year, is on the rise. Railways have been a stable means of travel in Japan. The reasons are the rising costs of air travel and a decrease in travel on passenger ships. Ongoing road improvement are increasing the length of our roads but it is not still sufficient for traffic demand. There is still chronic traffic congestion on the roads.

Historically, the first stage mode of modern transport in Japan were the ships and the Rail, and it was after World War II that motor vehicles and aircraft began to surface. The highly mobile society of Japan depends on transport services provided by vehicles, railways, ships, and aircraft. In terms of the domestic transport share, Railways account for 25. 5% for both passengers  
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and freight transport. Railway services were at first to come under the direct control of the government. The Japanese National Railways (JNR) was the first public corporation after World War II in 1949. In 1972, major changes were brought about to reform JNR as it was regionally divided and privatized. Japan Transport Economics Research Center (JTERC) was established to involve a comprehensive research activities on transport policies and strengthen policy study capabilities.

As there is a strong national opinion regarding the construction of shinkansen, new laws would need to be put in place.

### **The public transport services**

The National Government aims to provide safe and smooth transport services with a particular policy objectives. The aim is to utilize the energy of the private sector and make for a high share in the passenger transportation. The public transport should provide a solution for the Environmental Problems and be an effective measure for the society of aging population and fewer children. The focus is on revitalizing areas through extended network and promotes the tourism.

The Japanese society is struggling on the economic front after the World War II, and there is a focus on improving the transport capacity so that the transport system does not prove to be the bottleneck for the economic development. The government is in a rush to upgrade the transportation infrastructure and provide a stable supply of the transport service (Smith, 2003). By the 90's, Japanese society and economy are well matured, but still there was a need to de-regulate many of the social and economic systems.

The government decides to eliminate the restrictions on transport supply and demand.

## **The Shinkansen Proposal**

The proposal for Shinkansen as a standard gage passenger and freight line between Tokyo and Shimonoseki will certainly need ambitious plans in the coming years. The existing network of narrow-gauge railway lines in the mountainous terrain is not sufficient there are lots of indirect routes. It is doubtful that the terrain is suitable for the high-speed train. Japan needs a new high-speed lines. Japanese National Railways (JNR) will have to work with the politicians to back the plan of Shinkansen. The project can gain inspiration from 3000 series SE "Romancecar" train that set a world speed record of 145 km for the narrow gage. The Shinkansen project gets implemented in 1950 with a strong possibility of high-speed rail by Japanese National Railways.

JNR President strongly supported the construction of Tokaido Shinkansen, what with the demand of transport in this area between Tokyo and Osaka ever expanding. The double-track Tokaido Line had already reached its capacity limit, and the panel decided to construct a standard-gauge shinkansen. There is a need to use advanced safety systems and automatic train speed control. Construction of the Tokaido Shinkansen was to begin in 1959.

The first Shinkansen trains will run at speeds of up to 200 km/h that will be raised to 220 km/h The trains carry a distinct shape and will be known among the fastest trains running in the world. They intend to carry both passenger and freight and can be up to sixteen cars long.

## **Need for shinkansen**

Trains are well suited to Japan's strategic priorities, and the island nation is determined not to become too dependent on outside sources for its energy needs. Shinkansen will offer to be a high-speed, as well as low-energy transport. Japan's strategy is to develop transport system that use less energy. Commerce between important trading centers like Beijing and Shanghai will benefit from improved rail (Briginshaw, 2014). One should remember that Japan has been in isolation from the rest of the world. It is a densely forested and mountainous country made of islands. The island nation's lack of petroleum makes Shinkansen well suited to Japan's strategic priorities. The nation wants to use solutions that consume less energy. China is already taking transportation to the next level and the commerce between Beijing and Shanghai have already benefitted a lot from improved rail. There are other examples like India across the globe where a strong railway network has played a major role in the economy of the country. Cost and funding About ten years after World War II, Japan's economy has recovered and is now showing remarkable growth. There is a demand for increased passenger and freight capacities, and Japan is ready to make a heavy investment to hasten modernization of trunk lines. There were no special schemes for Shinkansen construction that were fully covered with loans with interest.

The project applies for government approval, and the cost of constructing the Shinkansen is estimated to be nearly 200 billion yen. This is an enormous amount of money and is raised in the form of a government loan and railway bonds. The World Bank provides US\$80 million low-interest loan. The final costs of the project were to go beyond 400 billion yen, almost the double.

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The budget shortfall became clear in 1963. The world bank needs to be convinced that the Shinkansen was not an experimental project, but based on proven technologies, as well as was a part of the existing JNR” Safety First” program.

Shin Sogo, the president of JNR goes ahead with the standard gage in spite of much opposition, as he believes that the international standard gage is indispensable for the improvement of the Japanese railways., Budget to ensure government approval for the shinkansen project, JNR set the original budget on the lower side. However, is expected to exceed as the contractions gets underway. Government funding would be partially used for the construction costs.

The Shinkansen project will cover Tokaido, Sanyo, Tohoku, Joetsu, Hokuriku, Yamagata and Akita. One should be prepared that shinkansen route through low-density rural areas will not be that profitable, and the project may slow down at times.

## **Technology behind shinkansen**

Shinkansen trains offer high acceleration and deceleration, and because of lighter vehicles minimize damage to the track. The coaches are air-sealed to make sure of stable air pressure when they enter tunnels at high speed.

## **Structural details and reliable maintenance**

Tokaido Shinkansen is the first bullet train system projected to be completed soon. It will cover a distance of 515 km between Tokyo and Osaka and transport thousands of passengers. However, the bullet train Systems will need special care as they are susceptible to fatigue damage in welding joints of steel bridges and will require routine inspections. Regular researches

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(Wright, 2009) for upgrading the structural and reliable maintenance for their efficiency is very essential. The structures of bullet train Systems need to follow a standardized design about the type of bridge and the welding joints. The first codes for the fatigue design of welded steel bridges are based at two million cycles, and these are considered as fatigue limits. Currently, the fatigue design for the Tokaido Shinkansen system is done on the basis of the codes established in 1960. A consideration is being made at setting design fatigue train load at 18 tons against design train load of 16 tons. The design fatigue train load for the subsequent bullet train system is expected to be set at 19 tons, keeping in mind the increasing train load. The highly congested bullet train system will require important support of technology and regular inspections based on continuous research and the careful maintenance efforts. Fatigue damage will need to be repaired in time (Yamada & Miki, 1989). The trains should be capable of exhibiting high rail/wheel adhesion performance and large passenger capacity without a locomotive. Its selling points would be safer, faster, punctual and reliable. Track maintenance (Isoura, 1989) will include measuring wheel weight, axle-box accelerometer and rail longitudinal level as well as record tracks images. Strengthening the infrastructures is essential to take care of earthquakes.

### **Hurdles expected**

As tunnels are an important part of Shinkansen, special consideration need to be made here for safety. There would be a need to make close inspections every ten days. The project has suffered from over manning and union disruptions. The debt is rising as the project moves on and has crossed trillions.



## **Apart from manmade hurdles, the Shinkansen project will also face opposition from the nature.**

Noise pollution will be a major concern and already the project is facing protests against noise pollution due to Shinkansen. New technologies will be implemented to contain the weight of cars and Noise barriers. Moreover, Japan is a country prone to earthquakes, and these trains will need timely alerts in the case of large earthquakes with the help of automatic braking. Some areas of Japan experience heavy snow in the winter, and the trains might need to slow their speed. This can disrupt the timetable. Sprinkler systems can take care of the issues but still one should expect delays of 10 to 20 minutes in snowy weather. Tree falls due to bad weather are common and can cause service interruptions. There is a need to take precautions to tackle deep snow with stronger sprinklers.

JNR is divided into six companies and JR East, and JR Central are the main ones. The privation process is still far from complete as the government still has a strong presence. JNR Settlement Corporation and JNR passenger companies agree to share the burden of the growing debt. Recessions, continuing interference from the government, and current economic downturn mean bad news for Shinkansen.

## **Impact of Shinkansen**

Shinkansen will not only improve the transport system but also the speed while lowering the costs of commuting. Tunnels for Shinkansen will also help avoid dangerous ferry crossings and provide an alternative to a traditional ferry route. It is expected to carry a perfect passenger-safety record (Sakamoto, 1986), as well as have many external effects on the

economic life. The influx of new industries and enterprises along the line, and reduction in travel time will increase the private investments. It will give rise to tourism and boost the industry, luring more of the local and international travelers. The number of passengers is expected to double. The robust transport infrastructure will stimulate the economic growth. This will have significant on the local economics and raise the employment.

## **Environmental impact**

Shinkansen project will have a positive impact on the energy sector, with the lower costs of travel. Shinkansen will prove to be the most effective transport mode and will lower Japans; oil consumptions and its dependency on outside sources. In terms of energy consumption, majority consumption is seen on the route from Tokyo to Osaka. If Shinkansen is not constructed, the oil consumption of Japan will exceed 300 million liters of oil in the near future. Moreover, Shinkansen will help minimize pollution as there would be lower CO2 emissions. It will also lower the potential accidents on roads and on ferries.

The high speed of the trains would mean higher noise and new technologies would be required to deal with noise pollution. Extensive line sound barriers would need to be installed. The wheel tread cutting methods need to improve, and the vehicle weight should be reduced. This would mean more costs and higher budgets. A micro sonic boom is heard over the areas where the train exits the tunnel. In order to contain the problem, specially designed flared hoods have been fitted on the tunnels.

It is appropriate to mention the advanced safety mechanisms for shinkansen that are simple enough to understand. The track is divided into blocks, and

only one train can occupy a block. The speed limit for each subsequent block and the train cannot go higher than those limits.

## **Conclusion on Shinkansen**

The word shinkansen literally means ‘ new main line’ and run on dedicated tracks that are wider than the standard Japanese gage. The original concept dates back to the Pacific War when the bullet train was first planned between Tokyo and Shimonoseki. All four islands of Japans are expected to get joined by rail. Privatization and management of the new links (Hood, 2006) will cut down the travel time. Additionally, more lines going north from Tokyo to Morioka and with more expansions over the years will ensure a stable economy for the country. The trains are expected to reach the maximum speed of 275 km/h till 1990. Plans would need to be amended, and designs modified to approve further constructions. It will serve the most stable and largest area in Japan, and Tokaido Shinkansen will cater to the highest density of population. It is expected to significantly reduce accidents and projected to be 100% safe technology, the safety record of shinkansen will be extremely encouraging. Other countries too would be encouraged to use the bullet train technology.

The Tokaido Shinkansen is expected to make a major contribution to Japan's economic growth post-war and will carry more than two hundred Shinkansen trains will run between Tokyo and Osaka each day, carrying thousands of passengers. The inter-city passenger transportation system is summed up as a large high-speed transportation capacity that will be known for its safety and reliability.

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