

ABSTRACT

Japan did much more than encourage the growth of its own economy when it opened the 515 standard-gauge Tokaido Shinkansen high-speed railway between Tokyo and Osaka in October 1964. It opened a completely new era in transport with a radically different railway, and in so doing, performed an invaluable service to the entire railway world by triggering a global boom in high-speed rail and injecting new life and restoring self-respect to an industry in decline. Almost 50 years on, speeds have increased from the Tokaido's initial 210 km/h to 300 km/h, the Shinkansen network now totals about 2.000 km, and the high-speed rail map of the world now also includes France, Germany, Spain, Belgium, Italy, Britain, Switzerland, Korea and Taiwan.

The new line was a response to serious and accelerating limitations in transport capacity along the main arterial corridor between Tokyo and Osaka. The situation arose as a consequence of the fact that the Tokaido corridor was home to about 40% of Japan's population, nearly 70% of its industrial output and 60% of national income. A long term solution was needed. Rejecting the idea of adding two tracks to the existing Tokaido Line, the decision of building a totally-separate and independent high-speed line was taken. This option allowed a higher number of daily trips between the two cities. Nevertheless this improvement helped to accelerate the massive migration from the rural areas to the big cities.

Since then, the Shinkansen has played an important role in Japanese business and leisure travel, becoming the world benchmark for high-speed transport. More than 2 billion passenger-km have been carried in a fast and safe service. Shinkansen technology has developed in line with Japan's social and economic changes and has seen rising speeds, cost savings and safety, as well as falling environmental impact. However, these achievements were not reached since JNR's privatization in 1987. After the initial boom of the Tokaido line, lots of projects for new lines were developed. An ambitious plan included all these new lines and predicted the construction of 7.000 kilometers of exclusive high speed rails. JNR's bad management caused a considerable reduction of this expected expansion. This meant a period of 20 years without construction of new lines or any technological innovation.

This way, by analyzing the Shinkansen lines and its components it's important to distinguish in which network's evolution stage they were constructed. There are several differences between the first and the actual trains, for example in the safety measures, the braking systems, the electricity captation or the motors. The principal innovation have been developed by the JNR's privatization resultant private companies. These measures have increased the train's commercial speeds, rising them up to 300 km/h. Future predictions foresee trains running at 360 km/h. These improvements allow a high frequency service with a world leading position in punctuality and safety.

This success shouldn't block us up. The task is to check if the initial model of the Tokaido Shinkansen has been transferred properly to the other Shinkansen sections in Japan. For this reason it is necessary to compare the results of each line. Already in advance we can detect that the Tokaido Line connects Japan's bigger cities. So it is difficult that other lines with less potential demand could achieve the same results. We should verify if the Japanese railways have could extrapolate and adapt Tokaido's model to other lines. It is obvious that a universal solution for each case doesn't exist. It depends on specific social, economic and environmental circumstances and requirements.

It is also convenient to outline which future possibilities do exist. JR companies are developing new solutions like JR East's Mini-Shinkansen or free gauge trains. These alternative methodologies don't reach conventional Shinkansen's performance, but they offer the possibility of connecting oneself directly to the network without waiting times or transfers. Completely new line construction is complicated because of its high costs and the need of governmental support. Nowadays the essential line to be constructed is the Hokkaido Shinkansen, that will connect Sapporo with the capital. Referring to the Japanese high-speed people usually speak about the possibility of introducing a magnetic levitation train between Tokyo and Osaka. This new line would clear the Tokaido Line. With Shanghai's precedent, the Chuo Shinkansen would link both cities in scarcely one hour. But it is required to inquire if this performance is feasible. It's worth noting that such a robust technology entails high costs.