Economics Of Akashi-Kaiko Bridge

written by Nirmal Raj Joshi | October 8, 2024

The Akashi-Kaikyo Bridge, recognized as the world's longest suspension bridge, spans a total length of 4 kilometers, with a suspended length of 2 kilometers. This engineering marvel, located in Japan, connects the two primary islands of Honshu and Shikoku. Recently, I had the opportunity to visit this bridge, and as a civil engineer, I can attest to its awe-inspiring and aesthetically pleasing design. During its construction, the bridge encountered a significant earthquake, which resulted in an increase in its span by approximately 0.80 meters compared to its original length. Remarkably, thanks to advanced Japanese technology and stringent safety measures, only six injuries were reported during the ten years of construction, with no fatalities.

Beyond its technical achievements, I became particularly interested in the financial and economic aspects of this bridge.

According to Wikipedia, "The total cost is estimated at 500 billion yen, and it is expected to be repaid by charging drivers a toll to cross the bridge. The toll is 2,300 yen, and the bridge accommodates approximately 23,000 vehicles daily. At a rate of 2,300 yen per vehicle, the annual revenue would total 19.5 billion yen. Given the interest expense on 500 billion yen, the bridge will never be fully repaid. However, with annual revenue constituting around 4% of the initial investment and considering the near-zero interest rates in Japan, the bridge is projected to pay for itself within 30 years, thereby contributing to the overall economic growth of the region."

Upon reviewing the aforementioned statement, I harbored doubts about its accuracy and undertook further research utilizing credible sources. My findings indicate that while Wikipedia's account holds partial truth, it overlooks crucial details.

The bridge was constructed during a period when road and rail infrastructures were under government control in Japan. Of the total investment for the bridge and the associated highway, 67% was financed by the central government, while the remaining funds were distributed among ten local governments. Notably, all government investments were made at a 0% interest rate.

Furthermore, financing was secured through a combination of government-guaranteed bonds, private sector bonds, and traditional loans. Additionally, Japan Railways made a modest investment; although there are no railway tracks on the Akashi-Kaikyo Bridge itself, tracks exist on other bridges that the same company operates.

The question of how the investment will be recouped arises. In the 1990s, a shift in government policies led to the privatization of several government entities, resulting in a complex system of revenue collection and payment for the bridge. The railway system must compensate the highway company for leasing the railway rights, while the highway itself collects tolls. Consequently, the total revenue is allocated towards loan repayment as well as the maintenance and operation of the bridge.

The figure below illustrates a summary of the payment structure associated with the bridge.

As previously mentioned, the cost of the Akashi-Kaikyo Bridge is substantial, such that even with cumulative traffic tolls, the generated revenue is unlikely to cover the normal interest rate on a hypothetical private investment scenario. However, since a significant portion of the funding was sourced from government investments at a 0% interest rate, the estimated payback period for the bridge is approximately 45 years, which also accounts for the costs associated with the connecting highways.

This situation underscores the necessity of government investment in large-scale infrastructure projects, particularly when aiming to foster societal development as a whole. Such projects often require substantial financial resources that exceed the capacity of private entities. Government involvement not only facilitates the financing of these ventures but also aligns with broader economic goals, such as improving connectivity, enhancing transportation efficiency, and ultimately driving regional growth.

It is also worth noting that the Government of Japan has previously taken on significant loans from international financial institutions, including the World Bank, to support infrastructure development initiatives. Most of these loans were repaid during the 1990s, and as a result, the current fiscal environment has relatively few outstanding loans, which positions the government to prioritize new projects without the immediate pressure of debt repayment.

In summary, while the Akashi-Kaikyo Bridge's financial outlook may initially appear daunting, its long-term economic implications, facilitated by government investment and low-interest financing, can contribute to the sustainable development of society and regional economies.

Reference:

http://www.jb-honshi.co.jp/english/library/pdf/bridges.pdf