High-speed rail and modernization of Indian Railways

On 14 September, the foundation stone was laid for the first high-speed rail (HSR) project between Ahmedabad and Mumbai. This is in continuation of the financial support pledged by Japan on 12 December 2015, committing about 85% of the total cost of the project as loan with an interest rate of 0.1% and a moratorium of 15 years and repayment period of 50 years. In this backdrop, the question of the tax payers' money wasted for the bullet train project does not hold water.

Given the track record of accidents in Indian Railways (IR), a pertinent question is whether IR will be able to operate HSR at a maximum speed of 320 kilometres per hour (kmph) without accidents, whereas our conventional trains operate at a maximum speed of 160 kmph or less. First, the guided transportation systems such as air and rail are generally safer than the unguided transportation system like road. A guided transport system is assigned a clear right of way, unlike the unguided transportation system, and thereby provide safer transport. The guided transport system is steered and controlled by very few who are well-trained in operating these modes and when they make mistakes do accidents usually occur. That is why in India and all over the world, air and rail have remained safer transport modes compared to road.

The important question then is if rail is a guided transport system, why are accidents happening regularly. Although rail carries about 10% of the passenger traffic against about 88% by road and 35% of freight traffic against about 65% by road, even after taking these frequent rail accidents into consideration, the number of accidents by rail is relatively low compared to road. However, it was reported that between 2011-12 and 2016-17, 50% of the accidents occurred due to derailments and 40% occurred due to collisions at level crossings and 10% due to other reasons. It is now well established that the conventional rail system suffers from overloading of tracks and the maintenance staff do not even get 2-3 hours of uninterrupted time for the upkeep of rail infrastructure. The non-availability of time to maintain tracks has been resulting in derailments in IR. In the case of HSR, the trains normally run between 06.00 hours and 23.30 hours and the time window between 00.00 hours and 05.00 hours is exclusively allotted to maintenance work. With no seclusion for railway lines and thousands of manned and unmanned level crossings at road junctions, the right of way of conventional rail network is very much restricted in practice. The HSR between Ahmedabad and Mumbai is to be constructed on an elevated corridor for the most part and underground in some urban areas. So, the right of way for HSR will be absolute and leave no scope for collision with any other transport mode; hence HSR will be much safer.

IR inherited the archaic railway system of the 19th century. Its efforts in the upgrade of conventional rail have just been incremental as all the changes had to be carried out in the rail system which is under operations. Although IR has improved its signalling system enormously, it still uses a spatial signalling system, whereas developed countries have adopted in-cab signalling and automatic train stop systems. The spatial signalling system is prone to human error and reduces the throughput of the rail network as only one train in one direction can run in a block (of, say, 15km). The in-cab signalling and automatic train stop systems which are employed in HSR are relatively insulated from human errors. Further trains can also run even with a headway of 3-4 minutes with no scope for collision. As a result, HSR provides at least five times the running capacity as that of conventional rail. HSR is a two-line system (one for each direction) with no crossings or minimal crossings between the lines. Hence the question of collision of trains coming in the opposite directions also does not arise in HSR.

When most of the developed countries moved towards train sets, due to legacy issues, IR has been manufacturing ICF (at the Integral Coach Factory, Chennai) coaches. Although ICF coaches kill and maim passengers enormously when accidents occur compared to the German technology-

based LHB (Linke Hofmann Busch) coaches, IR did not stop manufacturing ICF coaches till Suresh Prabhu, the then railway minister, passed an order in November 2016. Prabhu's order to stop manufacturing ICF coaches and retrofit the safety features of LHB coaches in ICF coaches was aimed at ensuring reduced fatalities and injuries in accidents. In HSR, train sets are used, which are much safer than LHB coaches.

Even if conventional rail is given a perfect right of way by fencing and removing all the level crossings with ROB/RUB (road over-bridges/under-bridges), to acquire speeds like that of HSR, the conventional rail lines should be aligned in straight line. To achieve this, the entire anatomy of the rail network would have to be changed. Upgrading tracks, signalling system or coaches of conventional rail to the level of HSR is akin to replacing every module of a personal computer from the 1980s with the latest modules of a laptop. Apart from serious compatibility issues, the upgraded PC will never be as compact, sleek, portable or give the same quality of service as a latest laptop. HSR is a wonderful opportunity for IR to move multiple levels in technology in one go and thereby bring a sea change in the speed and safety of rail travel and create a new benchmark for quality of service.

It costs about Rs1 trillion for constructing 500km of HSR system, averaging to Rs2 billion per kilometre. Even Metro rail systems cost about Rs3-4 billion per kilometre. Any modern rail system with state-of-the-art features would cost much more than the archaic conventional rail system. The cost of HSR is not just for the construction of tracks but for building HSR stations, high-end rolling stock and signalling system, maintenance depots and workshops, training of personnel, etc. Peevish remarks questioning the wisdom of India going for HSR when we are unable to run conventional train services properly are detrimental to efforts to modernize rail transport, which is long overdue.

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