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REVISITING THE RAIL GAUGE DEBATE

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Following extensive deliberations, a uni-gauge policy was launched in the 1990s and progressively, barring a few difficult sections, all the routes were converted to Broad Guage. File photo: Special Arrangement

While the predominant railway network in India is Broad Gauge (BG) with a width of 1.676 metres, the rapid rail transport system in Delhi, the high-speed rail line between Mumbai and Ahmedabad, and more than a score of metro rail systems in parts of the country are coming up on Standard Gauge (SG) of 1.435 m width.

The gauge debate began in the 1870s when the British introduced Metre Gauge of 1,000 mm in India after starting with BG in 1853. Following extensive deliberations, a uni-gauge policy was launched in the 1990s and progressively, barring a few difficult sections, all the routes were converted to BG.

However, by the turn of the 20th century, SG came to be first employed on metro rail networks following a Cabinet resolution which was based on a set of recommendations from a group of empowered Ministers, who left the decision on the choice of gauge to individual State governments.

One of the main proponents of SG was the legendary E. Sreedharan, then Managing Director (MD) of the Delhi Metro Rail Corporation. With an endorsement from a person of his repute, SG began to take roots in the country. Unfortunately, none of the projects since have gone into the detailed technical and economic analysis of the SG versus BG debate or the merits of integrating new rail systems with existing rail networks.

Let us examine the proffered advantages of SG. The most prominent factor in favour of SG is its universality. A majority of the metro and high-speed rail systems built in the last 20-30 years across the world are based on SG even if their respective national railways run on different gauges. Implicit here is the assumption that these systems can be stand-alone i.e. they need not be integrated with mainline railways.

However, the reality is more complex. While most metro rail networks are based on SG, metro rail systems in a number of cities and countries run on other gauges too. For instance, the metro rail systems in Tokyo (1,067 mm), Moscow (1,520 mm), Melbourne (1,600 mm) and the U.S.’s Bay Area Rapid Transport (1,676 mm) do not have SG and, except Moscow, these gauges do not conform to those of the countries’ respective national rails.

An argument favouring the SG is that it requires less space. The space requirement has two parts — the physical space required on the road and the aerial space required for elevated portions. Most metro rail systems today are built on elevated structures and the land required for pillars on roads for both SG and BG is the same. Moreover, aerial space requirements for elevated portions should not be a problem as such space is abundant.

Another is the availability of the latest technology for coach design as it is the prevalent system in developed countries. This argument would have held water decades ago. In today's Atmanirbhar India, it is unsound. India has its own semi-high-speed train designs such as the Vande Bharat series of trains designed and manufactured by the Integral Coach Factory in Chennai.

Yet another argument is the cost of the project with the assumption that the SG is a cheaper system. As per our assessment, the cost for a BG system would increase by around 5 %to 7% even with 25% underground network but at the same time, the BG system will be cheaper by around 10% per unit capacity as it can be designed to have approximately 15% higher capacity owing to wider coaches.

One objection to BG is the higher turning radius with a consequent reduction in speed and throughput. On a given curve, the speed on SG would be around 7% higher than that on BG. As speed restrictions are confined to curves, and assuming that 20%-40% of the track length has curves, the extra time taken on BG would be between 1.5%-3%, which means that for every 10 minutes of commuting time on SG, the additional time taken on BG would be around 10 to 20 seconds. Since this is rather negligible, the argument of a higher turning radius required for BG is not tenable.

Similarly, throughput, which is the maximum number of trains that can pass through a track during a certain period of time, depends on the minimum time gap permitted between two successive trains. As braking distance and acceleration characteristics are factors of train design, the throughput on a BG system would be similar to that of a SG system.

Gauge and track structure cannot be altered except at great cost. However, the rolling stock, which are the railway vehicles that are both powered and unpowered, has a relatively short lifespan of around 30 years. They can be replaced easily and subsequently put to use for other purposes.

The most important argument omitted by all stakeholders concerns the integration of new rail networks with existing ones. The existing rail system in the country carries around 8 billion passengers and more than 1,500 million tonnes of freight annually. Simultaneously, the system is also undergoing rapid expansion. Hence, it would be advantageous to integrate new rail systems with such an extensive system and prevent the creation of incompatible islands. It will help passengers and cargo move seamlessly. This would also improve patronage. Such a flexible system would also come in handy in situations of emergency.

Taking into account the above factors, the government should re-examine the issue with a view to building all future rail systems in BG.

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