

Advances in Transportation System

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Abstract— Transport is a means of carrying goods and people from one place to another. Transport refers to the activity that facilitates physical movement of goods as well as Individuals from one location to another. Transport plays an important role in today's modern world. It helps in removing the distance barrier. An efficient transport system is essential for sustainable economic development of the country and plays a significant role in promoting national and global integration. An efficient transport helps in increasing productivity and enhances competitiveness of the economy. Efficient transport is indispensable to the economic development of nation. The aim of the study is to create employment, industrial growth, place utility; it also serves several purposes, stability in prices, specialization and division of labour, use of economic resources and standard of living. In country like India, where the population is growing day by day need of advance in transportation is a basic necessity. Advances in the Bus system like BRTS, Rail system like METROS & AC locals, Smart airports and waterways will have a huge impact on human life as well as it will help in the sustainable development of the country. Advanced system like Hyperloop in India, can help passengers and freight travel within fraction of minutes from one's origin to a destination. The emerging transportation system in India will have a great impact on country's economic development. The rural areas will have a strong accessibility network and the problem of congestion will reduce to a great extent by adapting the advancement in the Transit system.

Index Terms: - Advanced Transportation, BRTS, Hyperloop, Metros

I. INTRODUCTION

Transport is a means of carrying goods and people from one place to another. Transport refers to the activity that facilitates physical movement of goods as well as Individuals from one location to another. Transport plays an important role in today's modern world. It helps in removing the distance barrier.

II. LITERATURE REVIEW

The old methodologies consist of walking, palanquins, bicycle, human-pulled rickshaws, cycle rickshaws, bullock carts/ horse carriages. Motor vehicle population in India is low as per international standards, with only 24.85 million cars on the nation's roads as of 2013. In total, about 21 per cent households have two wheelers whereas only 4.7 per cent of households in India have cars/jeeps/vans as per the 2011 Census. Despite this, the number of deaths caused by traffic is amongst the highest in the world and the increasing automobile industry in India is currently rapidly growing with an annual production of over 4.6 million vehicles, with an annual growth rate of 10.5% and vehicle volume is expected to rise greatly in the future.

India's rail network is the 3rd longest and the most heavily used system in the world, transporting 8.225 billion passengers and over 970 million tonnes of freight annually, as of 2015. The railways transport about 18 million citizens daily.

In 2015–16, Government of India, declared 106 National Waterways (NW) under Inland Waterways authority of India to reduce the cost of transportation and lower the carbon footprint by moving the traffic from surface roads and railroads to waterways. Despite ongoing improvements in the transport sector, several aspects of transportation are still riddled with problems due to outdated infrastructure and lack of investment in less economically active parts of the country. The demand for transport infrastructure and services has been rising by around 10% a year with the current infrastructure being unable to meet these growing demands. According to Goldman Sachs, India will need to spend US\$1.7 trillion on infrastructure projects over the next decade to boost economic growth. (2)

III. OBJECTIVES

Transportation planning tends to have multiple objectives, which usually include:

- Traffic congestion reductions

- Parking cost savings
- Consumer savings and affordability (savings to lower-income households)
- Improved mobility for non-drivers
- Improved safety
- Energy conservation
- Air, noise and water pollution reductions
- Habitat protection
- Support for local economic development. (2)

IV. METHODOLOGY & RESEARCH FINDINGS

Fuel consumption and emissions

As per a study conducted by Asian Institute of Transport Development (AITD) titled Environmental and Social Sustainability of Transport- Comparative Study of Rail and Road (2000), rail consumes 75% to 90% less energy for freight traffic; and 5% to 21% less energy for passenger traffic when compared to road. At present, railways are mostly dependent on electricity and high-speed diesel (HSD). The consumption of HSD on locomotive services in 2013-14 was 2780.90 million litres, a slight increase from 2699.62 million litres in 2012-13. The consumption of electricity on locomotive services increased from 13,853 million KWH in 2012-13 to 14411 million KWH in 2013-14. Direct consumption of coal by the railways is almost negligible on account of the phasing out of steam locomotives.

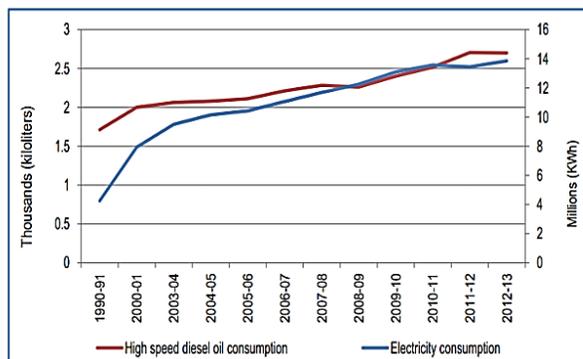


Fig. 01. Growth in consumption of electricity and hsd by railways for locomotive service

Source: (MoR 2015a)

In terms of emissions, rail transport emits 17-gram CO₂ equivalent per PKM as compared to 84-grams per PKM in case of road transport. Similarly, rail transport emits

28-gram CO₂ equivalent per NTKM as compared to 64 grams per NTKM in case of road transport.

Road sector is highly energy intensive in comparison to railways. It is also the largest consumer of energy within the transport sector from petroleum products. The road transport sector, comprising both passenger and freight transport, accounts for nearly 72 percent of High Speed Diesel (HSD) consumption in India. While the consumption of HSD in the road transport sector increased by 7.4 percent from 33.74 MT in 2009-10 to 36.24 MT in 2010-11, the consumption of motor spirit increased at a higher rate of nearly 11 percent from 12.82 MT in 2009-10 to 14.2 MT in 2010-11. With increasing air traffic, the fuel needs in the sector have also increased over the years particularly post 2000-01. The overall consumption of aviation turbine fuel (ATF) by the aviation sector grew from 3.3 MT in 2005/06 to 5.54 MT in 2011-12. During the Eleventh Plan period (2007-12), the average compound annual growth rate (CAGR) of ATF consumption was 6.8%. Water transport is one of the most environment friendly, cost-effective, and efficient modes of transportation. During 2011-12, the shipping sector consumed 0.54 MT of High Sulphur Diesel (HSD), 0.002 MT of Light Diesel Oil (LDO), and 0.37 MT of furnace oil.

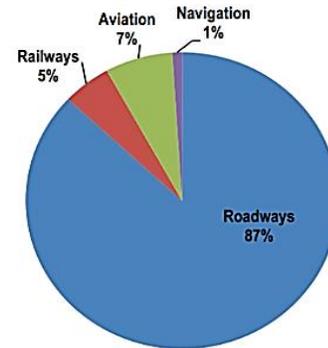


Fig. 02. Share of CO₂ equivalent emissions from transport sector in 2007.

Vehicle growth and composition

The total number of registered motor vehicles in India has increased from 0.3 million as on 31st March, 1951 to about 159.5 million as on 31st March, 2001. The total registered vehicles in the country grew at a Compound Annual Growth Rate (CAGR) of 9.9% between 2001 and 2011. In the business as usual

scenario, the total fleet size is further expected to increase to about 400 million by 2030. This growth will further worsen the traffic situation in the country and aggravate the related problems of increasing pollution levels, traffic jams, and vehicular emissions; having impact on the health and quality of life. The vehicle composition is primarily dominated by personalized modes (mainly two wheelers and cars) which account for nearly 86 percent of the total number of motor vehicles in the country. Two-wheelers alone accounted for 72 percent in the total vehicle population, followed by passenger cars at 13.5%, buses at 1.05%, goods vehicles at 4.8% and other vehicles (a heterogeneous category that includes three-wheelers, trailers, and tractors) at about 8.25%, as on 31st March 2012. Number of registered vehicles in five metropolitan cities, namely, Delhi, Bengaluru, Chennai, Hyderabad and Pune accounted for 49.3% of the total registered vehicles among the 35 million plus cities. At present, State Transport Undertaking (STU's) are primarily responsible for provision of interstate and intercity public transport services, in the form of bus services. Apart from the government run public buses, private run services also play a significant role in meeting the mobility needs in urban as rural India. These include various modes like buses, minibuses, low capacity vehicles like auto rickshaws, tempos, jeeps, etc. While personal vehicles have shown a phenomenal increase, the percent share of buses in the total number of registered vehicles has declined from 11.1 percent in 1951 to 1.1% in 2011-12, indicating slow growth. In India, the share of buses held by STU's in terms of total registered vehicles has decreased over years. The number of buses both held and operated by STU's have however shown an increase post the launch of Jawaharlal Nehru National Urban Renewal Mission (JNNURM) in December 2005, a Government of India scheme providing financial assistance for infrastructure development in cities. As per MORTH statistics, the total bus fleet held by STU's in India was reported at 1.40 lakh as on 31st March 2014 as against 1.02 lakh in 2006, registering an increase of more than 38 % over a period of eight years. Only 89.5 % of the total fleet held by STU's was operated in 2015.

Though the number of buses has increased post 2006, a gradual decline in the total number of passengers carried has been observed by the STU's. The total

number of passengers carried by the STU's in 2013-14 was 2,51,111 lakh passengers which was 1.6% lower than the number of passengers carried during 2012-13.

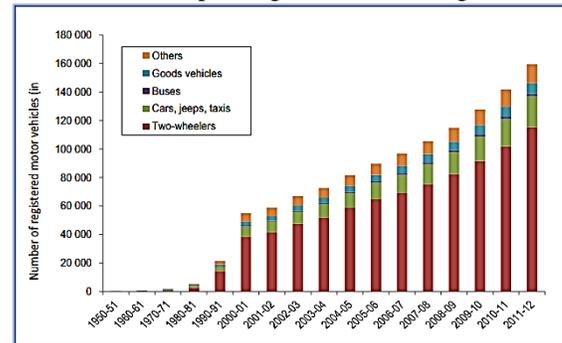


Fig. 03. Growth in the total registered motor vehicles in India (1951-2012)

**Source: MoRTH, 2013a
Traffic**

Though a decline was seen in traffic in 2008 due to increase in fuel costs and global economic recession, the sector however recovered once again in mid-2009. The traffic is further expected to rise exponentially in the coming decades.

Passenger traffic: In 2010-11, domestic air traffic in India carried by scheduled carriers was 54 million and is expected to increase by more than 8 times reaching 438 million passengers in 2030-31. International traffic at the Indian airports moving to and from India by 2030-31 is also expected to grow by 5.7 times from 38 million in 2010-11 to about 217 million in 2030-31. Freight traffic: As per the Report by the Working Group on Civil Aviation for the NTDPC, India's domestic and international cargo traffic (carried) from and to India is projected to reach a level of 3.6 and 8.2 million metric tonnes (MMT) per annum by 2030-31 respectively from the level of 0.5 and 1.2 MMT per annum in 2010-11. The Indian aviation sector is constrained in terms of capacity. Given the expected increase in traffic in future, the sector would need to develop adequate infrastructure and undergo extensive capacity augmentation to meet the rising demands. As per the Twelfth Five Year Plan (2012-17), it is estimated that there is an additional requirement of 30 functional airports by 2017 and about 180 functional airports in all over the next 10 years. In terms of investments, a total investment worth of INR 3, 77,275

crores have been estimated for airport infrastructure development work by 2031-32. (1)

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V. SCOPE OF THE STUDY

To provide innovative services relating to different modes transport and traffic management and enable various users to be better informed and make safer, more coordinated and smarter use of transport networks. (3) As it is fast, reliable, efficient, transportation is clearly the key in reducing supply chain costs and lead times between manufacture and consumption. Major motive of any transportation system is to make sure that the passage of people and commodities is secure, structured, swift, pleasant, suitable, inexpensive and eco-friendly. It is evident that transportation is the key component of a nation's progress transportation system needs to cope with this progress. (4)

VI. FUTURE SCOPE

As per our study, advancement in Rail systems, BRTS will help reduce the pollution and traffic congestion as demand for the private vehicles have increased. Advanced system like Metro rails, Mono rails and Hyperloop are designed to save time consumed for traveling, and also it is cost effective.

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