

# Role of Transportation Engineering Agencies in the Development of India: A Review

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**Abstract:** The Government of India recognizes the importance of the private sector in bridging the resource gap in investment and improving the operational and managerial efficiency in the transport sector in order to address capacity constraints and deficiencies in the existing transport infrastructure and meet rapidly growing demand. The Government is actively pursuing policies to promote private sector involvement in the development of transport infrastructure and services.

The experience in involving the private sector in transport development in India is the focus of the paper. It provides a broad overview of government policies and various initiatives that have been undertaken to promote private participation following various models. It also discusses achievements made in different subsectors and draws some conclusions on major policies.

The development of a nation is now a day fully related to the development of transportation infrastructures. The development of good roads leads to proper transportation of passengers and goods. The transportation engineering agencies in India are working very hard for the proper development of technology based reliable transportation system.

**Keywords:** Transportation Systems, NHAI, CIRT, CRRI, IRC, etc.

## Introduction:

Transportation is an important part of Indian economy but it is of very low and pathetic standards as compared with international standards. Since, the economic liberalization of the 1990's, infrastructure development has progressed rapidly; today there is a variety of modes of transport by land, water and air. However, India's relatively low GDP per capita has meant that access to transport has not been uniform.

Public transport remains the primary mode of transport for most of the livelihood India, and India's public transport system are among the most heavily used in the world. Indian's rail network is 4<sup>th</sup> longest and heavily used transportation system in the world, transporting 8224 million passengers and over 969 million tons of goods annually, as per analysis of 2012.

Government of India declared 106 National Waterways (NW) under inland waterways Authority of India to reduce cost of transportation and lower the carbon footprint by moving the traffic from surface roads and railroads to waterways.

Currently, India is having lots of transportation related agencies which are working very hard for the development of better transportation systems. They are regularly doing research on technology based transportation system called ITS.

**Table 1. Waterways Transportation in India**

| NW   | ROUTE                  | RIVER                          | DISTANCE |
|------|------------------------|--------------------------------|----------|
| NW 1 | ALHABAD – HALDIYA      | GANGA-BHAGIRATHI-HOOGLI RIVERS | 1620 KM  |
| NW 2 | SADIYA – DHURBHI       | BRAHMAPUTRA RIVER              | 891 KM   |
| NW 3 | KOLLAM – KOTTAPURAM    | WEST COAST CANAL               | 205 KM   |
| NW 4 | KAKINADA – PONDICHERRY | GODAVARI – KRISHNA RIVERS      | 1095 KM  |
| NW 6 | TALCHER – DHARMA       | MAHANADI DELTA RIVERS          | 620 KM   |
| NW 7 | LAKHIPUR – BHANGA      | BARAK RIVER                    | 121 KM   |

**Table 2. No. of Registered Vehicles in Metro Cities**

| Metro cities | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | CAGR (%) |
|--------------|------|------|------|------|------|------|------|------|------|------|----------|
| Ahmadabad    | 799  | 846  | 899  | 978  | 1075 | 1632 | 1780 | 1451 | 1586 | 1691 | 8.6      |
| Bangalore    | 1550 | 1593 | 1680 | 1771 | 1891 | 2232 | 2617 | 2179 | 2640 | 3016 | 8.5      |
| Chennai      | 1150 | 1257 | 1356 | 1895 | 2015 | 2167 | 2338 | 2518 | 2701 | 2919 | 10.7     |
| Delhi        | 3423 | 3635 | 3659 | 3971 | 4237 | 4186 | 4487 | 5492 | 5899 | 6302 | 6.8      |
| Hyderabad    | N.A. | N.A. | 1241 | 1319 | 1356 | 1433 | 1522 | 2181 | 2444 | 2682 | 10.9     |
| Jaipur       | 598  | 644  | 693  | 753  | 824  | 923  | 1051 | 1177 | 1289 | 1387 | 9.9      |
| Kolkata      | N.A. | N.A. | 801  | 842  | 875  | 911  | 948  | 987  | 573  | 581  | 9.5      |
| Lucknow      | N.A. | 465  | 556  | 615  | N.A. | N.A. | N.A. | 801  | 962  | 1025 | 9.0      |
| Mumbai       | 970  | 1030 | 1069 | 1124 | 1199 | 1295 | 1394 | 1503 | 1605 | 1674 | 6.3      |
| Nagpur       | 331  | 416  | 459  | 503  | 543  | 770  | 824  | 884  | 946  | 1009 | 13.0     |
| Pune         | 593  | 620  | 658  | 697  | 755  | 827  | 874  | 930  | 1141 | 1153 | 7.3      |

**Table 3. Record of Vehicle According to the Categories**

| Year | All Vehicles | Two Wheeler | Cars  | buses | Good Vehicle | Others |
|------|--------------|-------------|-------|-------|--------------|--------|
| 1951 | 306          | 27          | 159   | 34    | 82           | 4      |
| 1961 | 665          | 88          | 310   | 57    | 168          | 42     |
| 1971 | 1865         | 576         | 682   | 94    | 343          | 170    |
| 1981 | 5391         | 2618        | 1160  | 162   | 554          | 89     |
| 1991 | 21374        | 14200       | 2954  | 331   | 1356         | 2533   |
| 2001 | 54991        | 38556       | 7058  | 634   | 2948         | 5795   |
| 2011 | 141866       | 101865      | 19231 | 1604  | 7064         | 12102  |

### Some Transportation Engineering Agencies in India:

1. **NHAI: The National Highways Authority of India (NHAI)** is an autonomous agency of the Government of India, responsible for management of a network of over 70,000 km of National Highways in India.<sup>[4]</sup> It is a nodal agency of the Ministry of Road Transport and Highways. NHAI has signed a memorandum of understanding (MoU) with the Indian Space Research Organisation for satellite mapping of highways.
2. **CRRI: Central Road Research Institute or CRRI** established in 1952 is a constituent laboratory of Council of Scientific and Industrial Research. This premier national institute located in Delhi is engaged in doing research and development in area of design, construction, maintenance, management of roads, runways. It also works in area of traffic and surface transportation planning.
3. **IRC: Central Road Research Institute or CRRI** established in 1952 is a constituent laboratory of Council of Scientific and Industrial Research. This premier national institute located in Delhi is engaged in doing research and development in area of design, construction, maintenance, management of roads, runways. It also works in area of traffic and surface transportation planning.
4. **CIRT: CIRT** offers management development programmes covering general management, transport operations and maintenance engineering. The programmes are meant for practicing managers in STUs, other organisations operating transport services besides road transport officials. All programmes are residential and their duration ranges from one week to four weeks. In addition, the Institute undertakes consultancy and research assignments on transport policy, transportation planning, traffic management, maintenance management, materials management, human resource management and management information systems.

## **Problem Faced by Transportation Agencies in India:**

1. Most of the Indian roads are unsurfaced (42.65%) and are not suitable for use of vehicular traffic. The poor maintenance of the roads aggravates the problem especially in the rainy season.

According to one estimate there is about per year loss of Rs. 200 crores on the wear and tear of the vehicles due to poor quality of roads. Even the National Highways suffer from the deficiencies of inadequate capacity, weak pavement, poor riding quality, distressed bridges, unbridged level crossings, congested cities (lack of by-pass roads), lack of wayside amenities and safety measures.

2. One major problem on the Indian roads is the mixing of traffic. Same road is used by high speed cars, trucks, two wheelers, tractors, animal driven carts, cyclists and even by animals. Even highways are not free from this malady. This increases traffic time, congestion and pollution and road accidents.

3. There are multiple check-posts, toll tax and octroon duties collection points on the roads which bring down the speed of the traffic, waste time and cause irritation to transporters. Rate of road taxes vary from state to state and inter-state permits are difficult to obtain.

4. There is very little participation of private sector in road development in India because of long gestation period and low-returns. The legislative framework for private investment in roads is also not satisfactory. The road engineering and construction are yet to gear themselves up to meet the challenges of the future.

5. There has been no stability in policy relating to highway development in the country. It has changed with the change of government. There are a number of agencies which look after the construction and maintenance of different types of roads. Since there is no co-ordination between these agencies their decisions are often conflicting and contradictory.

6. There is shortage of funds for the construction and maintenance of roads. Instead of giving high priority to this task the percentage allocation has decreased over the years While percentage share of plan allocation was 6.9 per cent in the First Five Year plan it has come down to less than three percent in the Eighth Plan.

## **Role of Transportation in Indian Economy:**

India's transport sector is large. It caters to the needs of 1.1 billion people. In 2007, the sector contributed about 5.5 percent to the nation's GDP, with road transportation contributing the share. Good physical connectivity in the urban and rural areas is essential for economic growth. Since the early 1990s, India's growing economy has witnessed a rise in demand for transport services.

However, the sector has not been able to keep pace with rising demand and is proving to be a drag on the economy. Major improvements in the sector are required to support the country's continued economic growth and to reduce poverty.

Indian Railways is one of the largest railways under single management. It carries some 17 million passengers and 2 million tons of freight a day in year 2007 and is one of the world's largest employers. The railways play a leading role in carrying passengers and cargo across India's vast territory. However, most of its major corridors have capacity constraint requiring capacity enhancement plans.

Roads are the dominant mode of transportation in India today. They carry almost 90 percent of the country's passenger traffic and 65 percent of its freight. The density of India's highway network -- at 0.66 km of highway per square kilometer of land -- is similar to that of the United States (0.65) and much greater than China's (0.16) or Brazil's (0.20). However, most highways in India are narrow and congested with poor surface quality, and 40 percent of India's villages do not have access to all-weather roads. Rural Roads- A Lifeline for Villages in India: Connecting Hinterland to Social Services and markets Ports. India has 12 major and 187 minor and intermediate ports along its more than 7500 km long coastline. These ports serve the country's growing foreign trade in petroleum products, iron ore, and coal, as well as the increasing movement of containers. Inland water transportation remains largely undeveloped despite India's 14,000 kilometers of navigable rivers and canals.

India has 125 airports, including 11 international airports. Indian airports handled 96 million passengers and 1.5 million tons of cargo in year 2006-2007, an increase of 31.4% for passenger and 10.6% for cargo traffic over

previous year. The dramatic increase in air traffic for both passengers and cargo in recent years has placed a heavy strain on the country's major airports. Passenger traffic is projected to cross 100 million and cargo to cross 3.3 million tons by years.

### Steps Taken to Improve Transportation in India:

Government legislation supported the nascent sustainable transportation industry. It was only in 1991 that the first stage emission norms came into force for petrol vehicle and norms for diesel vehicles were passed in 1992. Today, we lag EU norms by about four years. We need more urgent regulations to drive improvement and further incentives to nurture product development.

The Government is already discussing policies for fleet modernization and vehicle inspection and certification with SIAM (Society of Indian Automobile Manufacturers). Government initiatives are also tackling the building and maintenance of better roads. We need to pick up the pace of construction and think creatively about how to address urban-rural connectivity and urban congestion issues.

The Government is also enabling the spread of CNG and LPG infrastructure and offering custom duty benefits for CNG vehicle parts. Many parts manufacturers make CNG/LPG fuel kits so that consumers can choose between diesels or petrol fuels and sustainable fuels. As a result, there are more than 100,000 CNG commercial vehicles in Delhi and Mumbai. In fact, Delhi has the largest number of CNG commercial vehicles running anywhere in the world.

Private companies need to do their part too, both to take full advantage of Government and market opportunities. Pressure for positive change from the industries that underpin India's transformational economic growth can drive pro-environment legislation, increase government attention to infrastructure, and educate consumers about sustainable choices.

Indian companies are investing in technology for hydrogen power-trains and biodiesel, hybrid, and BEV (Battery-operated Electric Vehicle) models. The technology is available, now large scale adoption depends on affordability, fuel availability, and infrastructure. With the automotive industry eager, the Government is responding with both grants for R&D and incentives for consumers. Battery-operated electric vehicles enjoy a zero excise tax and custom duty, and hybrid vehicles enjoy a lower excise rate of 8%. Departments like the Delhi Government and Ministry of New and Renewable Energy (MNRE) offer consumers' incentives to purchase of electric vehicles.

**Table 4. Comparative Costs of Traditional Transportation Revenue Collection Methods**

| Revenue Source                              | Collection cost of revenue as per % | Source   |
|---|-------------------------------------|--|
| Fuel tax                                    | 0.88%                               | 50 states (FHWA, 2008b)  |
| Sales tax                                   | 2%                                  | Washington State (Washington DOR, 2002) and Illinois (Hubbard, 2003) |
| Income Tax                                  | 5%-7%                               | U.S. (Friedman and Waldfogel, 1994)                                  |
| Manual Toll Collection                      | 11%-19%                             | NJ and MA Turnpikes (Friedman and Waldfogel, 1994; Poftak, 2008)     |
| Mixed manual and electronic toll collection | 12%-20%                             | 9 Bridges and highways in the U.S. (Washington State DOT, 2007)      |

## Role of Transportation Agencies in Integrated Border Check Posts:

Chhattisgarh Road Development Corporation has been assigned the work of Modernization and Computerization of Integrated Border Check Posts at 16 locations in the State of Chhattisgarh. Chhattisgarh Road Development Corporation Limited, Raipur invites proposals from the interested Firms/Companies/organizations for providing consultancy services for Preparation of DPR, including Bid Process Management for Civil Construction, Electrical and Electronic Works of Modernization and Computerization of 16 (sixteen) Integrated Border Check Posts at various locations in the State of Chhattisgarh. Interested Bidders should provide information, demonstrating that they have the required qualifications and relevant experience to perform the services.

ICPs being set up in NER

1. **Phase-I: Akhaura (Tripura), Moreh (Manipur), Dawki (Meghalaya)**
2. **Phase-II: Sutarkhandi (Assam), Kawarpuchia (Mizoram)**

**Table 5. Integrated border check post (Phase I)**

| S.No. | Location       | State       | Border           | Estimated Cost |
|-------|----------------|-------------|------------------|----------------|
| 1     | Petrapole      | West Bengal | India-Bangladesh | 172            |
| 2     | Moreh          | Manipur     | India-Myanmar    | 136            |
| 3     | Raxaul         | Bihar       | India-Nepal      | 120            |
| 4     | Attari (Wagah) | Punjab      | India-Pakistan   | 150            |
| 5     | Dawki          | Meghalaya   | India-Bangladesh | 50             |
| 6     | Akaura         | Tripura     | India-Bangladesh | 60             |
| 7     | Jogbani        | Bihar       | India-Nepal      | 34             |

**Table 6. Integrated border check post (Phase II)**

| S.No. | Location     | State         | Border           | Estimated Cost |
|-------|--------------|---------------|------------------|----------------|
| 1     | Hili         | West Bengal   | India-Bangladesh | 78             |
| 2     | Chandrabagha | West Bengal   | India-Bangladesh | 64             |
| 3     | Sutarkhandi  | Assam         | India-Bangladesh | 16             |
| 4     | Kawarpuchia  | Mizoram       | India-Bangladesh | 27             |
| 5     | Sunauli      | Uttar Pradesh | India-Nepal      | 34             |
| 6     | Rupaidiha    | Uttar Pradesh | India-Nepal      | 29             |

## Intelligent Traffic Management System in India:

The 25 km long Noida Expressway is India's first public sector high-speed link to implement intelligent traffic management system (ITMS) officials. International agencies from France, Austria and Abu-Dhabi have shown interests in the project of implementing this high-tech traffic management system, which as claimed by officials will curb rampant accidents and ensure safe ride on this road, which connects Delhi with Yamuna Expressway.

Participation of international agencies in this project has left officials surprised and enthusiastic.

“The authority is likely to select an agency in next one month. And the work on this project will begin on ground in first week of January next year. Once the work begins, we will complete this project in 6 months to ensure a safer ride to commuters,” said Sandip Chandra senior project engineer of the Noida authority. Officials told that Steria a France based agency is the world's first to implement ITMS on an Expressway in France. Another agency- Afkon from Austria had implemented this high-tech system on India's high-speed link - Yamuna Expressway. And third agency- Abu-Dhabi based falcon has expertise in dealing with railway traffic management. “The authority will first time allot R 43 crore mega project through a global tender process. Yamuna Expressway has this system, but it does not send traffic violation and other details to police and other emergency control rooms. But ITMS on Noida Expressway will be completely high-tech in all senses,” said Chandra.

After frequent deaths in road accidents in December on this road, the Noida authority has got 'safety audit' done of this entry restricted road by a central road research institute (CRRI).

The new system will work on latest 4G (not on 3 or 2G) spectrum to deliver traffic updates through a wireless network. “Digital display boards to be put at smaller distances on the Expressway will inform commuters about a traffic disruption, congestion, accident and other conditions well in advance to avoid inconvenience for precaution,” said another official. The system will need setting-up 144 CCTVs at each 1 km distance for better monitoring, and enforcement of traffic rules said officials.

According to police 2-3 accidental deaths each week are reported on this road. “Over speed, sudden halting of vehicles and poor traffic management including poor policing to curb traffic violations are some of the reasons that the Expressway has turned into a death trap,” said authority official, requesting anonymity.

### **Role of Toll Plaza in Financing 21<sup>st</sup> Century Transportation:**

With the growth in the number of vehicles the need for expansive roads catering to thousands of vehicles moving across India has become inevitable. However, considering the present situation the current toll system has several drawbacks. Due to the limited number of toll booths and slow collection process, the average waiting time per vehicle is 10 minutes. This results in losses worth thousands of cores of Rupees in terms of fuel wastage. This long wait time often results in drivers getting irritated resulting in verbal spats and physical fights among people and the toll attendants. Several such incidents have been reported in the press with some of these fights even resulting in the death of the toll plaza attendants.

In addition, there are numerous cases of toll plaza accidents which happen due to the sudden lane changing by drivers for faster clearance. The major reason behind this is that, the security at the tolls is insufficient and it is beyond the traffic police’s control to manage the vast number of vehicles. We keep hearing of many such mishaps at toll plazas which mostly occur due to negligence either on the people’s side or due to lack of control from the government agencies including the police. In case of events, where lives are lost, such losses are a life shattering experience.

As is well known, in such a scenario, the general public is a little hesitant in taking responsibilities of any such mishap. Hence it is incumbent on the government to come up with an effective plan which bridges the gap between the toll management and the public expectation of the service that they experience. Introduction of an effective toll plaza operation plan by the government, its strict implementation and monitoring which would result in a more efficient and a more responsive and efficient system could be a good option for easing the challenges associated with the existing tolling process.

### **Conclusion:**

This report has outlined role of transport agencies in Indian development. It has focused particularly on government roles steps to improve transportation in the country, increase in economic growth of country and in providing transport sector infrastructure and why this is generally a role for which governments take direct responsibility.

It also focused on role of private companies, toll plaza, integrated border check posts, intelligent traffic management for development in India. They really played a great role in development of India. It has been observed as from past decades, the different agencies have contributed a lot for the national development and infrastructure development too.

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### **Web:**

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