

## Chapter 1

### Introduction

#### 1.1 Infrastructure

The adequacy of infrastructure helps determine one country's success and another's failure – in diversifying production, expanding trade, coping with population growth, reducing poverty, or improving environmental conditions. Good infrastructure raises productivity and lowers production's costs, but it has to expand fast enough to accommodate growth. The infrastructure capacity grows step for step with economic output, a 1% increase in the stock of infrastructure is associated with a 1% increase in gross domestic product (GDP) across all countries<sup>1</sup>.

The World Bank (1994)<sup>1</sup> has included the following services in the definition of economic infrastructure.

- Public utilities – Power, Telecommunications, Piped water supply, Sanitation & sewage, Solid waste collection and disposal, and Piped gas.
- Public works – Roads & Major dams, and Canal works for irrigation & drainage.
- Other transport sectors – Urban & interurban railways, Urban transport, Ports & waterways, and Airports.

The broader definition also includes social infrastructure such as education, health etc. which is equally important but has different set of issues.

Infrastructure is vital to the nation's economic growth. Infrastructure may

---

<sup>1</sup> World Bank (1994), *World Development Report 1994- Infrastructure for Development*, Washington DC: The World Bank

be considered to be the skeleton on which the society is built. Adequate funding is required to construct and maintain the requisite infrastructure. The immediate need for such projects coupled with chronic budget shortages experienced by public agencies has encouraged the use of innovative financing.

In many countries, particularly, developing countries shortage of public funds have led Governments to invite private sector entities to enter into long term contractual agreements for financing, construction and operation of capital intensive infrastructure projects. A Public Works Financing database of worldwide projects between 1985 and 2004 shows that 1,121 Public Private Partnership infrastructure projects (road, rail, airport, seaport, water, and building), representing \$450.9 billion worth of investment, were funded and completed with the majority of the projects being in Europe, Asia, and the far East as shown in Table 1.1.<sup>2</sup>

**Table 1.1**  
**PPP Projects funded and completed between 1985 and 2004**

Region	Percentage (%)
Europe	37.8
Asia and the Far East	36.7
North America	15.8
Latin America, Africa, Middle East	9.7
Total (\$450.9 billion)	100

(Source : World Bank Report)

## 1.2 Infrastructure in India

While Infrastructure is recognised as a crucial input for economic development, there is no clear definition of infrastructure according to the current usage of the term in India. Planning Commission (2008)<sup>3</sup> has included

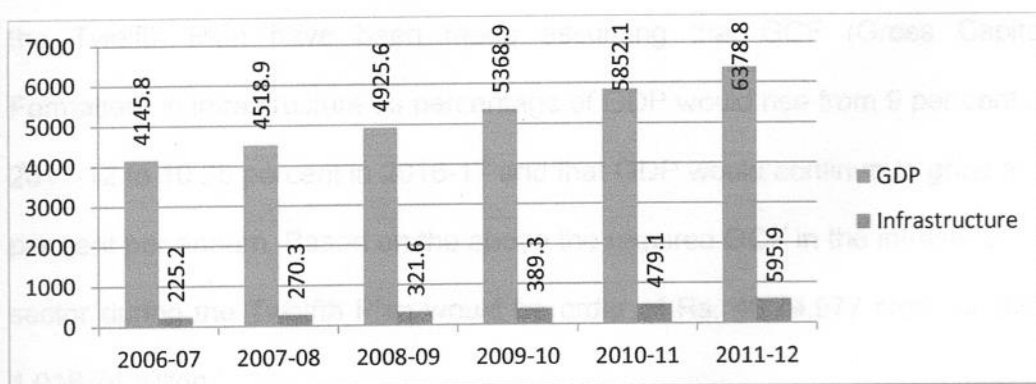
<sup>2</sup> World Bank (June, 2006), *India: Building Capacities for Public Private Partnerships*, South East Region: The World Bank

<sup>3</sup> Govt. of India, Planning Commission (2008), *Definition of Infrastructure*, New Delhi: The Secretariat for the Committee on Infrastructure.

the following in the broad definition of infrastructure:

- i) Electricity (including generation, transmission and distribution) and R&M of power stations,
- ii) Non-Conventional Energy (including wind energy and solar energy),
- iii) Water supply and sanitation (including solid waste management, drainage and sewerage) and street lighting,
- iv) Telecommunications,
- v) Roads & bridges,
- vi) Ports,
- vii) Inland waterways,
- viii) Airports,
- ix) Railways (including rolling stock and mass transit system),
- x) Irrigation (including watershed development),
- xi) Storage,
- xii) Oil and gas pipeline networks.

The Figure 1.1 represents comparison between GDP and Infrastructure Investment in India, as per bottom up estimates at 2006-07 prices.<sup>4</sup>



(Source: Planning Commission, Projections in 11<sup>th</sup> Five Year Plan)

(Amount is in Rs. Thousand Crore at 2006-07 prices)  
**Figure 1.1 : GDP & Infrastructure investment in India**

<sup>4</sup> Government of India, Planning Commission (August, 2008), *Projections in the 11<sup>th</sup> Five Year Plan*, New Delhi: The Secretariat for the Committee on Infrastructure

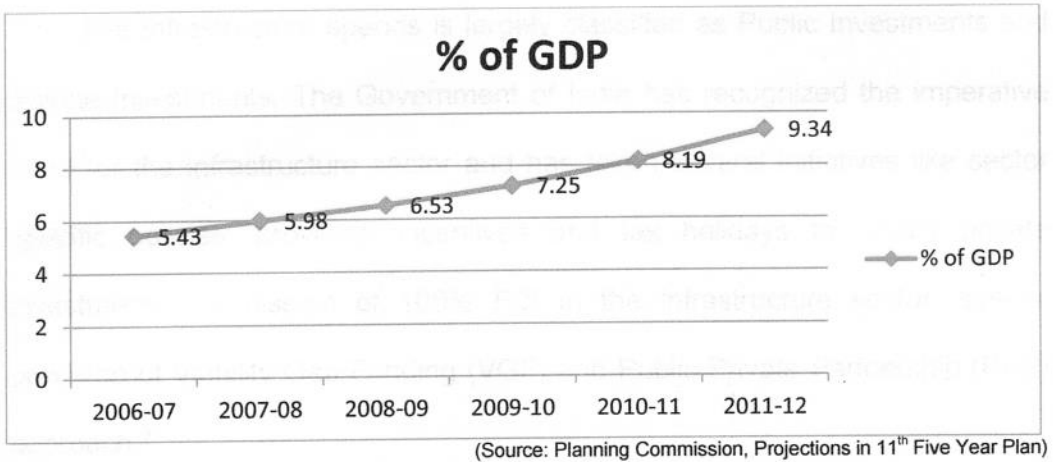
According to the Planning Commission, to sustain a GDP growth of 9%, investments in infrastructure should be 10 - 11% of GDP. Infrastructure development is capital intensive and requires huge resources.<sup>5</sup> The investment in infrastructure during the Tenth Plan was Rs. 8,87,794 crore which constituted 5.07 per cent of GDP. This included Rs. 1,75,203 crore of investment by the private sector. To overcome the infrastructure deficit, the Eleventh Plan has projected an investment of Rs. 20,56,150 crore which would imply an investment of 7.6 per cent of GDP during the Eleventh Plan and 9 per cent of GDP in the terminal year of the Plan (2011-12). This includes public sector investment of Rs. 7,65,622 crore in the Central sector and Rs. 6,70,937 crore in the State sector, leaving the balance of Rs. 6,19,591 crore, to be invested by the private sector. Private capital would thus fund 30 per cent of the total investment during the Eleventh Plan, as compared to 20 per cent realised during the Tenth Plan.<sup>6</sup>

It is obvious that the thrust for development of infrastructure would need to continue during the Eleventh Plan and beyond into the Twelfth Plan if the economy is to maintain the growth achieved in the recent past. Projections for the Twelfth Plan have been made assuming that GCF (Gross Capital Formation) in infrastructure as percentage of GDP would rise from 9 per cent in 2011-12 to 10.25 percent in 2016-17 and that GDP would continue to grow at 9 per cent per annum. Based on the above the required GCF in the infrastructure sector during the Twelfth Plan would be order of Rs. 40,74,977 crore or US\$ 1,018.74 billion.<sup>7</sup>

<sup>5</sup> Kuboki, Kazumasa & Prakashchandra (2012), *Japanese Project Manual for Infrastructure Projects in India*, Delhi : Feedback-JODC

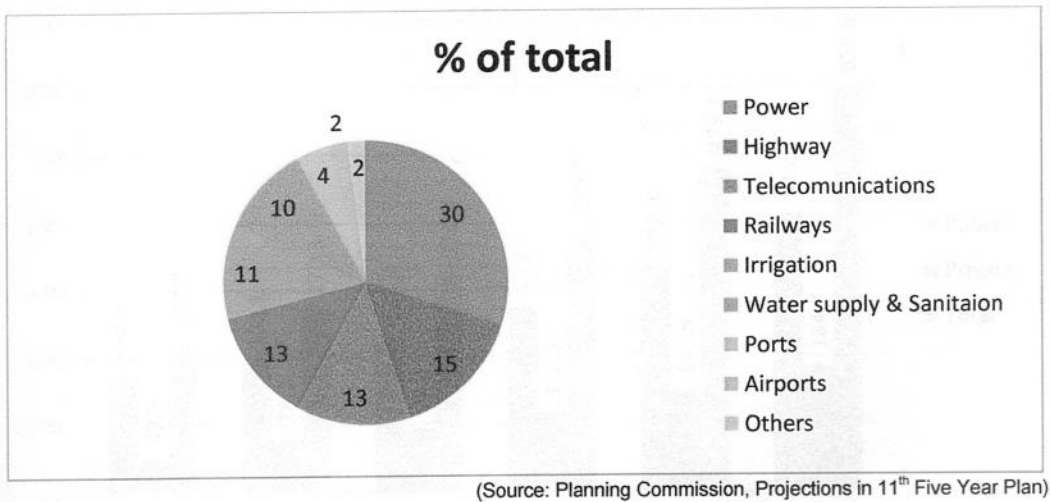
<sup>6</sup> Government of India, Planning Commission (January, 2010), *Private Participation in Infrastructure*, New Delhi: The Secretariat for the Committee on Infrastructure

The total investment in infrastructure as a percentage of GDP is shown in Figures 1.2.<sup>7</sup>



**Figure 1.2 : Infrastructure Investment in % of GDP**

The sector wise investment allocations as per 11th Five Years Plan are as shown in Figure 1.3.<sup>7</sup>



**Figure 1.3 : Sector wise investment in % terms**

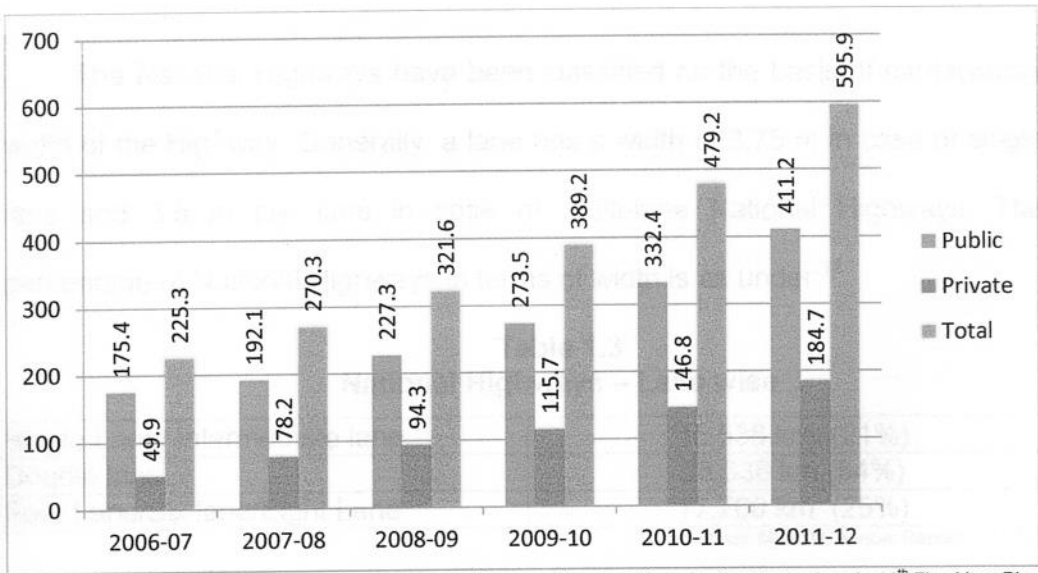
The transition from traditional procurement to PPPs involves a change of procedures, perceptions and mind-set. The key to making PPPs acceptable is to create an environment where PPPs are seen as a way of attracting private

<sup>7</sup> Government of India, Planning Commission (August, 2008), *Projections in the 11<sup>th</sup> Five Year Plan*, New Delhi: The Secretariat for the Committee on Infrastructure

investment into public projects in a transparent and fair manner with the objective of enhancing welfare.<sup>8</sup>

The Infrastructure spends is largely classified as Public Investments and Private Investments. The Government of India has recognized the imperative need for the infrastructure sector and has taken several initiatives like sector specific policies, providing incentives and tax holidays to attract private investments, permission of 100% FDI in the infrastructure sector, special provision of Viability Gap Funding (VGF) and Public Private Partnership (PPP) approach.<sup>9</sup>

The Figure 1.4 showing the Public investments, Private investments and total investments at 2006-07 prices based on bottom-up estimates are as under.<sup>10</sup>



(Source: Planning Commission, Projections in 11<sup>th</sup> Five Year Plan)

(Amount is in Rs. Thousand Crore at 2006-07 prices)

**Figure 1.4 : Public, Private & Total investment in Infrastructure**

<sup>8</sup> Government of India, Planning Commission (January, 2010), *Private Participation in Infrastructure*, New Delhi: The Secretariat for the Committee on Infrastructure

<sup>9</sup> Kuboki, Kazumasa & Prakashchandra (2012), *Japanese Project Manual for Infrastructure Projects in India*, Delhi : Feedback-JODC

<sup>10</sup> Government of India, Planning Commission (August, 2008), *Projections in the 11<sup>th</sup> Five Year Plan*, New Delhi: The Secretariat for the Committee on Infrastructure

Private sector investments in infrastructure expected to increase from 19% in X five year plan (2002-2007) to 50% in the XII five year plan (2012 -17) with biggest increase in Roads, Ports and Railways<sup>11</sup>.

### 1.3 ROAD NETWORK:

India is having one of the largest road network of 41.09 lakh km, it consists of National Highways, Expressways, State Highways, Major District Roads, Other District Roads and Village Roads with following length distribution.<sup>12</sup>

**Table 1.2**  
**Road Network – Category wise**

National Highways/Expressway	71,772 km
State Highways	1,54,522 km
Major District Roads	2,66,058 km
Other District Roads & Rural Roads	36, 17, 240 km

(Source: MoRTH, Annual Report 2011-12)

The National Highways have been classified on the basis of carriageway width of the Highway. Generally, a lane has a width of 3.75 m in case of single lane and 3.5 m per lane in case of multi-lane National Highways. The percentage of National Highways in terms of width is as under:<sup>12</sup>

**Table 1.3**  
**National Highways – Lane wise**

Single Lane/ Intermediate lane	15,536 km (21%)
Double lane	38,536 km (54%)
Four Lane/Six lane/Eight Lane	17,700 km (25%)

(Source: MoRTH, Annual Report 2011-12)

#### 1.3.1 ROAD TRANSPORT:

Although National Highways constitute only about 1.7 per cent of the road network, it carries 40 per cent of the total road traffic. Easy availability,

<sup>11</sup> Kuboki, Kazumasa & Prakashchandra (2012), *Japanese Project Manual for Infrastructure Projects in India*, Delhi : Feedback-JODC

<sup>12</sup> Government of India, MoRTH (2012), *Annual Report (2011-12)*, New Delhi: MoRTH

adaptability to individual needs and the cost savings are some of the factors which go in favour of road transport. Road transport also acts as a feeder service to railway, shipping and air traffic. The number of vehicles has been growing at an average pace of around 10 per cent per annum. The share of road traffic in total traffic has grown from 13.8 per cent of freight traffic and 15.4 per cent of passenger traffic in 1950-51 to an estimated 62.9 per cent of freight traffic and 87 per cent of passenger traffic by the end of 2009-10. The rapid expansion and strengthening of the road network, therefore, is imperative, to provide for both present and future traffic and for improved accessibility to the hinterland. In addition, road transport needs to be regulated for better energy efficiency, less pollution and enhanced road safety<sup>12</sup>.

### 1.3.2 Financing the Roads Sector

In the Tenth Plan the anticipated expenditure on roads and bridges is Rs. 1,44,892 crore, out of which expenditure by Centre is Rs. 71,534 crore, expenditure by states is Rs. 66,354 crore and expenditure by private sector is Rs. 7,004 crore. Planning Commission has projected the investment in roads sector during the Eleventh Plan at Rs. 3,14,152 crore, which is 2.2 times the Tenth Plan investment. Its break up by public sector (Rs. 2,07,359 crore) and private sector (Rs. 1,06,792 crore) is depicted in Table 1.4. and that by type of roads is in Table 1.5.<sup>13</sup>

**Table 1.4**  
**Public and Private Investment in Roads & Bridges – Eleventh Plan**  
(Rs. Crore at 2006-07 Prices)

Investment By	Public	Private	Total
Centre	1,07,359	79,840	1,87,199
States	1,00,000	26,952	1,26,952
<b>Total</b>	<b>2,07,359</b>	<b>1,06,792</b>	<b>3,14,152</b>

(Source: Planning Commission – Projections in Eleventh Plan)

<sup>13</sup> Government of India, Planning Commission (August, 2008), *Projections in the 11<sup>th</sup> Five Year Plan*, New Delhi: The Secretariat for the Committee on Infrastructure



**Table 1.5**  
**Projected Investment by type of Roads during Eleventh Plan**  
(Rs. Crore at 2006-07 Prices)

National Highways	State Roads	Rural Roads	NE Roads	Total
1,45,853	1,26,952	36,582	4,765	<b>3,14,152</b>

(Source: Planning Commission – Projections in Eleventh Plan)

The dependence on private sector for financing in road sector is expected to go up sharply from 4.8 per cent in 10<sup>th</sup> plan to 40.3 per cent in Eleventh plan. In absolute terms also the private sector outlay is proposed to increase by 19 times the tenth plan outlay. Attracting such a large quantum of private investment would require suitable policy mix to attract investment, which government was able to put up since 2005.<sup>13</sup>

#### 1.3.2.1 CENTRAL ROAD FUND:

The Central Government has created a dedicated fund called Central Road Fund (CRF) from collection of Cess on Petrol and High Speed Diesel Oil. Presently, Rs.2/- per litre is collected as cess on petrol and High Speed Diesel (HSD) Oil. The accrued fund is distributed for development and maintenance of National Highways, state roads, rural roads, and for railway over bridges / under bridges and other safety features as provided in Central Road Fund Act, 2000. Cess is being distributed in the following manner.<sup>14</sup>

- (i) Rs. 1.50 is being allocated in the following manner:
  - (a) 50% of the cess on high-speed diesel (HSD) oil for development of rural roads.
  - (b) 50% of cess on HSD and the entire cess collected on petrol are there after allocated as follows:
    - 57.5% towards the development and maintenance of National

<sup>14</sup> Government of India, MoRTH (2012), *Annual Report (2011-12)*, New Delhi: MoRTH

### 1.3.3.1 Highways; Highways Development Programme (NHDP) - Phases I & II

- 12.5% for construction of road under or over bridges and safety works at unmanned railway crossing;
  - 30% on development and maintenance of state roads. Out of this amount, 10% is kept as reserve by the Central Government for allocation to states for implementation of state road schemes of Inter-State Connectivity and Economic Importance (ISC& EI).
- (ii) Remaining cess of Rs. 0.50 per litre is entirely allocated for development and maintenance of National Highways.

### 1.3.3.2 State Road Development Programme (SRDP) - Phases I & II

The Ministry is responsible for approval and release of funds to states for development of state roads under the CRF and formulation of standards and specifications for roads and bridges in the country besides acting as a repository of technical knowledge on roads and bridges.

### 1.3.3 National Highways Development Programme (NHDP):<sup>14</sup>

The Government of India has entrusted National Highways Authority of India with responsibility of implementing a greatly expanded National Highways Development Project spread over seven phases with an estimated expenditure of Rs. 2,35,690 crore till 2015. As per the Government decision of April, 2007 all new projects under different Phases of NHDP will be taken up on Public Private Partnership (PPP) by awarding them first on BOT (Toll), failing which to be taken up on BOT (Annuity) and failing which through Engineering Procurement Construction basis with the approval of the Government.

### 1.3.3.4 National Expressway Development Programme (NEDP) - Phases I & II

### 1.3.3.1 National Highways Development Programme (NHDP) Phases-I & II:

NHDP Phase I and II comprises of the development of National Highways to 4/6 lane standards of the following routes:

- (a) Golden Quadrilateral (GQ) connecting 4 major metropolitan cities viz. Delhi-Mumbai-Chennai-Kolkata-Delhi.
- (b) North South & East West Corridors (NS-EW) connecting Srinagar to Kanyakumari and Silchar to Porbandar with a spur from Salem to Cochin.
- (c) Road connectivity of major ports of the country to National Highways.
- (d) Other National Highway stretches.

NHDP Phase I which was approved by Cabinet Committee on Economic Affairs in December 2000 at an estimated cost of Rs. 30,300 crore (1999 prices) comprises 5,846 km of Golden Quadrilateral, 981 km of NS-EW corridors, 356 km of Port Connectivity and 315 km of other National Highways, a total of 7,498 km.

NHDP Phase II which was approved in December 2003 at an estimated cost of Rs. 34,339 crore (2002 prices) comprises mostly NS-EW Corridor (6,161 km) and other National Highways of 486 km length, the total length being 6,647 km.

### 1.3.3.2 NHDP Phase-III:

The Government has approved 4/6 laning of 12,109 km of National Highways on Build, Operate and Transfer (BOT) basis at an estimated cost of Rs. 80,626 crore under NHDP III-A (Mar, 2005) & III-B (Mar, 2006). The phase has been approved in two parts i.e. Phase III A consisting total length of 4,815 km at an approved cost of Rs. 33,069 crore and Phase III B, consisting

total length of 7,294 km at an approved cost of Rs 47,557 crore. The scheduled date of completion of NHDP Phase III is December, 2013. Under this phase, the stretches have been identified as per the following criteria:

- i) High density traffic corridors not included in Phase I & II
- ii) Providing connectivity of state capitals with NHDP (Phase I & II)
- iii) Connectivity of center's of tourism and places of economic importance.

#### **1.3.3.3 NHDP Phase-IV:**

This Phase envisages upgradation of about 20,000 km of National Highways to 2-lane with paved shoulders on public private partnership (PPP) basis IV-A (5000, Dec.,2006), IV-B (5000, Dec., 2007), IV-C (5000, Dec., 2008) & IV-D (5000, Dec.,2009).

#### **1.3.3.4 NHDP Phase-V:**

Six laning of 6,500 km of existing 4 lane National Highways under NHDP Phase V (on Design Build Finance and Operate basis) has been approved in October 2006 at an estimated cost of Rs 41,210 crore (at 2006 prices). Six laning of 6,500 km includes 5,700 km of Golden Quadrilateral and 800 km of other stretches.

#### **1.3.3.5 NHDP Phase VI:**

NHDP Phase VI envisages development of 1,000 km fully access controlled expressways under Public Private Partnership (PPP) model following Design -Build - Finance - Operate (DBFO) approach. The Phase VI of NHDP has been approved at an estimated cost of Rs. 16,680 crore in November 2006 (at 2006 prices). The total fund required for this phase is Rs. 16,680 crore, out of which Rs. 9,000 crore will come from private sector and the balance Rs 7,680 crore will be Government funding for bridging the

viability gap as well as meeting the cost of land acquisition, utility shifting, consultancy etc.. The entire projects are targeted to be completed by December, 2015.

#### **1.3.3.6 NHDP Phase VII:**

Government has approved construction of stand alone Ring Roads, Bypasses, Grade Separators, Flyovers, elevated roads, tunnels, road over bridges, underpasses, service roads etc on BOT (Toll) mode under NHDP Phase VII in December 2007 at an estimated cost of Rs. 16,680 Crore (at 2007 prices).

#### **1.3.4 Financing National Highways Development Programme:**

Presently, the development and maintenance of National Highways is financed by following modes:

- (a) Government's general budgetary sources
- (b) Dedicated accruals under the Central Roads Fund (by levy of cess on fuel)
- (c) Lending by international institutions like World Bank, Asian Development Bank and Japan Bank for International Cooperation
- (d) Private financing under PPP frameworks:
  - Build Operate and Transfer (BOT) / Design Build Finance Operate and Transfer (DBFOT) – Investment by private firm and return through levy and retention of user fee (Toll).
  - Build Operate and Transfer (Annuity) – BOT (Annuity) – Investment by private firm and return through semi – annual payments from NHAI as per bid.
  - Special Purpose Vehicle – SPV (with equity participation by NHAI)

• Market Borrowings.

NHAI also has a provision for providing grant up to 40 per cent of the project cost to make projects commercially viable. However, the quantum of grant typically constitutes the bid parameter in BOT projects generally not viable based on toll revenues alone and decided on a case to case basis. The disbursement of such grant is subject to provisions of the project concession agreements.

NHAI projects, with higher traffic volumes, have also been bid out on Negative Grant. However, under the revised Model Concession Agreement, projects under BOT/DBFOT framework have also been awarded on a revenue share basis, where the bidder offering the highest revenue share (subject to technical qualification) is awarded the project.<sup>15</sup>

#### 1.4 Statement of Problem

It is generally recognised that lack of infrastructure is one of the major constraints on India's ability to sustain a high rate of growth in GDP, which is necessary to make a significant difference to quality of life and elimination of poverty over the next ten years. Infrastructure plays a vital and often decisive role in determining the overall productivity and development of country's economy hereby decisively affecting the quality of life of the citizens. The World Economic Forum rates India's infrastructure at 89<sup>th</sup> position out of 133 countries surveyed.<sup>16</sup>

Infrastructure development is capital intensive and requires huge

<sup>15</sup> Government of India, Planning Commission (2006), *Report of the Core Group Financing of NHDP*, New Delhi: The Secretariat for the Committee on Infrastructure

<sup>16</sup> Kuboki, Kazumasa & Prakashchandra (2012), *Japanese Project Manual for Infrastructure Projects in India*, Delhi : Feedback-JODC

resources. However, public resources available for investment in physical infrastructure are limited, as social sectors have a priority in the allocation of budgetary resources. Moreover, bulk of the investment in infrastructure sectors such as irrigation and water resource management, inland waterways, dredging at ports and in the economically or situationally disadvantaged regions would have to come from the public sector. It is, therefore, essential to rely on private participation for funding the financially viable infrastructure projects in order to bridge the financing gap.<sup>17</sup>

In view of the above, the Government has been promoting investment in infrastructure sectors through a combination of public investment, private investment and Public Private Partnerships (PPPs). As a result, PPPs are increasingly becoming the preferred mode for construction and operation of commercially viable infrastructure projects in sectors such as highways, airports, ports, railways and urban transit systems.<sup>17</sup>

The public resources are limited, it is therefore essential to rely on private investment in Infrastructure sector. At present, the road sector contributes about 70% of transport sector and the investment in road sector is about 15% of total investment in infrastructure. The research is limited to evaluation of National Highways Development Programme of India.

---

<sup>17</sup> Government of India, Planning Commission (January, 2010), *Private Participation in Infrastructure*, New Delhi: The Secretariat for the Committee on Infrastructure