

# Study on Innovations of Infrastructure Management in Indian Context



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*Infrastructure development is essential for the growth of any country. Since Independence, infrastructure development was mainly undertaken by Government of India and source was annual budgets mainly. Now the government is not spending and hence the need for other ways to fund the Infrastructure development. Many Indian companies have come up to help government, but with only private companies the development is not easy. Government with the help of private players have formed public private partnership with various models like BOOT, BOLT to facilitate private participation which helps in the growth of country's economy.*

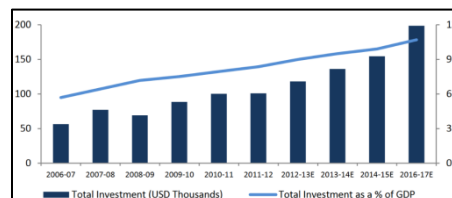
**Keywords:** Public private partnership, Foreign Direct Investment, Build Own Operate Transfer (BOOT), Infrastructure finance, Private investment

## 1. Introduction

Infrastructure is the backbone of every country. Infrastructure development is directly proportional to the growth of country's economy. Infrastructure includes roads, railways, ports, real estate, telecom, health, solid waste management. Investing in Infrastructure will accelerate the growth of Gross Domestic Product (GDP). One percent of GDP growth requires an additional one percent to be invested in infrastructure (Bhattacharya et al, 2002).

There is a huge scope for the growth of India's Infrastructure. Currently, we have bad / damaged roads with no proper connectivity, shortage of power, shortage of drinking water, non-hygienic sanitation, time taking trains which are not optimally running to their capacity. This results in inefficiencies, demotivation, low productivity, slowing down the growth of urbanization. Government spending on Infrastructure will not only create Infrastructure but also result in creating employments to tons of people, providing opportunities to individuals to think and contribute. Investing in Infrastructure provides employment in different ways - direct, in-direct and derived ways. In direct way, people who work on the core ex. Construction work in case of real-estate. In in-direct way, people who provide the raw materials / other people who support the construction work will be benefitted. People who are benefitted in direct and in-direct way spend money on various things. When people spend money to buy goods, the seller of the goods will be benefitted in the form of derived way.

India being a developing country is still upgrading from agriculture to services. Prior to the liberalization in 1991, India didn't have the required skills /technical man power to build high quality Infrastructure and the technologies, production methods used were primitive. India is slowly moving from agriculture to services sector. Since Independence, development of infrastructure was mainly done by the Governments. Governments relied on the annual budgets which was not sufficient to provide the Infrastructure which was proportional to the growth of our population. Private parties, religious institutions, NGOs, charitable organizations even though they contributed to the development in small way, their contribution could not cover large population. Post the economic liberalization, India opened its market to outside players who could come, contribute and grow in a mutual beneficial way. Over the years, the policy matured (maturing) and coming with various models / ways to allow the private players to participate in economic growth of the country.



Share of Infrastructure in GDP

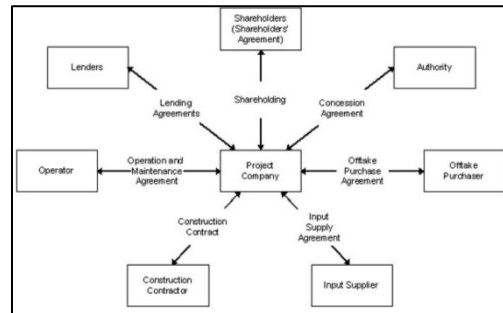
Source: 12<sup>th</sup> Five-year plan, Aranca Research

## 2. Discussion in Brief

### Infrastructure Models (PPP)

To facilitate the private participation (usually called the concessionaire), Government (concession) has come up with various models where they can join hands with the Government and any other stake holders and contribute to the growth. Few of the models include Build Own Operate Transfer (BOOT), Build Own Operate (BOO), Build Own Lease Transfer (BOLT), Design Build Operate (DBO). These models can be applied in green field projects (Projects initiated from scratch) or brownfield project (projects involving extension or enhancements).

In case of DBO, the private player will have the rights to design the project. There will be nodal agencies from the Government side who would be monitoring and from whom the design approvals must be obtained. Post which he would be building / executing the project. Once the operations start, the private player would be running the show for a short period to recover his investments. The funding will be from the Government. BOLT – in case of this model, the private player will build the project and he would be the co-owner for a specified period. Post which he would be leasing the project to recover his investments, then transfer the ownership back to Government.



Contractual Structure of a BOT Project

Source: World Bank Group, Public Private Partnership in infrastructure sector

We can find many case studies which have gone through Public private participation model in India. This model is application in most of the infrastructure projects related to roads, railways, ports, airports, municipal works etc.

**Roads**

Roads are the basic infrastructure needed for the smooth commutation between various places. High quality roads ensure optimized connectivity improving productivity. India has 4.24 million KM which is the 2nd highest in the world. The main sources of funds are the budgetary support, capital grants, maintenance grants, loans from multilateral agencies and market borrowings. There are various organizations set up by Government to manage and monitor road network like the National Highways Authority of India (NHAI), Ministry of Road Transport and Highways (MORTH). There are lot of problems / inefficiencies internally because of which these organizations are not able to perform well and achieve the expected results.

<b>National Highways/Expressways</b>	<b>93,051 km</b>
State Highways	1,54,522 km
Major and Other District Roads	25,77,396 km
Rural Roads	14,33,577 km

Source: NHAI Annual Report 2014-2015

**NHAI's SPV**

NHAI with the association of private players have formed a Special Purpose Vehicle in the form of a company - Indian Highway Management Company Limited (IHMCL). This has been formed under the companies Act with equity participation from NHAI (25%), Concessionaire (50%) and Financial Institutions (25%). This is formed primarily to collect tolls – Electronic Toll Collection (ETC)

**Case Study of Delhi Gurgaon Expressway**

Jaiprakash Industries ltd and DS Construction ltd in a joint venture delivered this project. This was on BOT (Build Operate Transfer) model with a lease period of 20 years. NHAI had laid out the specifications for the expressway. The construction period was included in the lease period to make sure the project is completed earlier. SPV for this expressway was called Delhi Gurgaon Super Connectivity ltd. Both the companies had close to 50% share initially. It was NHAI's responsibility to get the land and providing the Right of Way to the concessionaire free from all encumbrances. Existing highway's operation and maintenance was NHAI's responsibility. It was NHAI's onus to get all the clearances from various departments. NHAI also agreed to aid with loan facility from State Bank of India at prime lending rate. This was to cover any shortfall of payments during the tenure. Some of the financial information of the project as a below

Financial Information	
Particulars	Amount
Debt	₹ 383.3 crore
Equity	₹ 164.2 crore*
TOTAL	₹ 547.5 crore

\*including a grand of Rs 61 crore

Source: Public Private Partnership Projects in India, December 2010

### Smart City Mission

World is moving at a very fast rate. More and more people are moving towards the cities to make a living. In India too, the coming generations of farmers are more interested to work in factories / companies in cities than to work in agriculture. With this in mind, Government need to work at a much higher pace to provide the basic amenities like water, housing, sanitation, education and health. Government has come up with the concept of Smart City Planning (SCP). Currently, we have 31% of our population in urban areas and they contribute to 63% of our GDP which can go up to 75% by 2030. Few big cities grew up overnight and before the Government could think of them, these cities were out of control. These big cities are plagued by problems like narrow roads, shortage of water, no hygiene sanitation, lack of awareness / education. These problems have grown up over the days increasing problems. Even though the Governments are trying to patch up here and there, people still struggle and curse. The idea of Smart city is to provide all the amenities people want for survival. The city would be planned thinking from a very long distance. The advantage is that since the city is still growing, changes to the existing infrastructure can be made with very less or minimal changes.

Smart city will include facilities like

- A abundant water supply
- Health and education.
- Required right voltage electricity
- Availability of Government in the hands of people
- More stress on IT and digital revolution as these cities are the future IT hubs
- Pure, fresh and clean environment
- Sanitation
- Solid waste management
- high end public transport connecting the corners of the city
- Transparent governance
- Safety, security of women, child, senior citizens and the specially abled
- Improvement / creation of parks, play grounds

The execution of the Smart City Plan will be done by the Special Purpose Vehicle (SPV) formed. The SPV formed will be responsible to utilize the fund effectively. The SPV will have private players and people appointed by State/Central Government and local bodies. A special grant fund is created for this purpose and the grants are released upon fulfilment of certain conditions and approval from the nominated members. The private players involved will be responsible for running the development activities as prescribed. They have the liberty to appoint consultants, approach public to know their views, National Green Tribunals (NGT) etc. MoUD has a framework laid out for this purpose. The funding is from the Central Government with the same contribution from the State Governments. Rs100 crore per city per year has been set up for the coming 5 years.

### Atal Mission for Rejuvenation and Urban Transportation (AMRUT)

India is a population rich country. It's close to 1.3 billion people and amounts to 17.5% of the world's population. Giving basic facilities to the entire population is very challenging task. One of the programs on this line is the AMRUT. A committee called High Powered Expert Committee which did analysis on the infrastructure deficit found a huge gap in the system which could be corrected by increasing the spending in the basic needs of people. Government off late has realised that investing on infrastructure which has direct effect on the people with in short span of time is more beneficial than with projects with long gestation period. Ex. Drinking water facility, sanitation rather than roads to connect to major cities. The main agenda of AMRUT are

- Access to drinking water
- Finding new sources
- Any existing sources need to be modernized.
- hygiene sanitation
- solid waste disposal
- preventing floods by effective storm water management
- Increasing the greenery, open grounds, parks.
- Increase the public transportation system.

Government has setup quality bench marks for achieving all these. This mission has been setup in few cities as a pilot project. There are various criteria to select the city like the population, demography, background etc. Government has tried its max to provide justice to all states in selecting the cities. Government has set up Rs. 50,000 crore for the five years from FY 2015-15 to FY2019-20. This will be Central Government driven project.

### Indian Railways

Indian Railways (IR) can be considered as the veins of the nation. It connects various parts of the country. It is built for both passenger and logistics. There are about 12,000 passenger trains and 9000 freight trains. Passenger trains carry about 23 million passengers which is the population of Australia. Freight trains carry out 3 million tonnes of freight. There are various

stations across the length and breadth of the country. Over the period of years, the percentage amount of transport expenditure spent on IR is slowly reducing and it is shifting towards Road transport. Its reduced to 30% in 11<sup>th</sup> (2007-2012) as compared to 56% in 7<sup>th</sup> plan (1985-90). Indian railways contribute close to 1% of GDP.

Financing of railway projects is mainly supported by Budgetary support, Railway Safety fund, Internal resources and Extra budgetary resources. Lion's share comes from the Budget. Even though there are many new railway projects announced in the budget every year, they remain on paper itself because of the financial crisis, inefficiencies and lack of motivation among the stake holders. IR has been with various private players to execute, analyse and check the feasibility of setting up, enhancing various railways lines, connectivity to ports, private container trains, introduce railway wagon, construction of locomotives. The results from these was a mixed reaction with some projects meeting the expectation and few not even touching the break even.

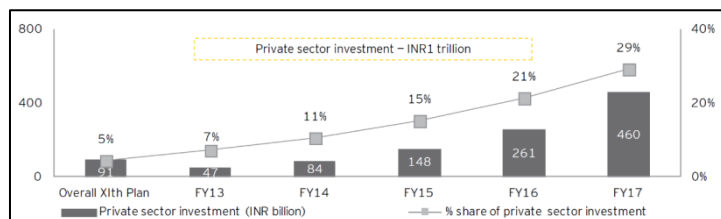
Ports like Pipavav, Mundra, Mangalore, Kandle, Dahej, Krishnapatnam and Dhamara improved a lot in rail connectivity with the private participation. Ministry of Railways is encouraging private players to contribute in the various capabilities like expanding rail connectivity, building of caches, private containers etc. MoR have a policy set up with difference models

- Joint ventures
- Non-Government private line model
- Build-Operate-Transfer (BOT)
- Capacity augmentation through funding by customer or through annuity model.

Government has also allowed the Foreign Direct Investment under the automatic route in railways from 2014. FDIs can invest in construction, operation and maintenance of

- Suburban corridor projects through PPP-
- High speed train projects
- Dedicated freight lines
- Rolling stock including train sets, and locomotives or coaches manufacturing and maintenance facilities-;
- Railway Electrification;
- Signalling systems;
- Freight terminals;
- Passenger terminals;
- Infrastructure in industrial park pertaining to railway lines or sidings including electrified railway lines and connectivity to main railway lines; and
- Mass Rapid Transport Systems.

IR in coalition with Google have set up Wi-Fi facility in around 400 stations. This in an important move towards the digitalization of India.



*Estimated private sector investment in railways in Twelfth FYP*  
*Source: Draft Twelfth FYP (2012-2017), Planning commission, GoI*

### Make in India

Make in India (MII) was launched in 2014 by the then Prime Minister Narendra Modi. The idea was to increase the number of jobs, improve the skills set, improving / enhancing the innovation and bringing quality standards in the manufacturing sector. A number of new initiatives were kicked off, many policies were tweaked/enhanced to get the best of best companies to invest in India. The MII mission encourages people to contribute as entrepreneurs. The Ease of Doing Business (EODB) is the ranking system set up by World Bank Group. The rank is given to a country. Higher rank indicates the country's willingness to attract manufacturing factories by simplifying rules and regulations, providing more facilities through which the companies can settle, build, operate and prosper. India's EODB rank is 131 in 2016 as compare to 134 in 2015. Some of the EODB facilities include attracting business proposals, understanding their needs, getting the required permits/approvals like power, water, land, taxes, cross border taxation, Government has planned to act as facilitator to understand and facilitate the industries rather than acting as a regulator.

Infrastructure is very much needed for the growth of manufacturing sectors. Government has taken up various measure like the smart cities, developing the cities by green field, brown field projects. There are various sectors which are in the list to be boosted like chemicals, construction, defence manufacturing, electrical machinery, electronic systems, food processing, IT and BPM, Leather, media and entertainment, mining, oil and gas, pharmaceuticals, ports and shipping, textile and garments, thermal power, tourism and hospitality and wellness.

Few of the companies and their plans of investment

- Philips (Home Country: Netherlands, Investment Amount: USD 60 Million) Investment would be to expand its Pune facility. Will be focusing on Healthcare, ultra sound machines, CT scans and MRIs.
- GE HealthCare (Home Country: United Kingdom) Plans to invest in training of healthcare and education experts. The target is to train more than 100,000 people in the next 5 years under the Skill India Initiative.
- General Motors (Home Country: USA, Investment Amount: USD 1,000 Million) Plans to invest on creation of new jobs in GM India, bring out new models and improve/enhance its production at Talegaon manufacturing site.
- MRF Limited (Home Country: India, Investment Amount: USD 1.876 Million) Plans to expand its Tamil Nadu, Hyderabad, Trichy and Goa. Also have plans to set up new production plant.
- Apollo Tyres (Home Country: India, Investment Amount: USD 238 Million) Plans to expand its current production capacity by expanding its facilities / manufacturing units.
- ITC Limited (Home Country: India, Investment Amount: USD 583 Million) Plans to invest in two consumer food factories, IT development center, a hotel and 20 factories for FMCG products
- McDonalds (Home Country: USA, Investment Amount: USD 115 Million) Plans to add 250 restaurants and 100+ McCafes.
- Boeing (Home Country: USA) Boeing and Tata Advanced Systems Limited are planning to work together in the aerospace and defense manufacturing systems.

## Power

### Case study of TPDDL (Tata Power Delhi Distribution Limited), Delhi

Delhi is the capital of India and it is a highly-urbanized city. It is densely populated. There are many factories, manufacturing units, IT parks which consume electricity heavily. Since years, Delhi Electricity Supply Undertaking (DESU) had taken the responsibility of providing electricity. The commercial /revenue generation wing of the DESU was not up to the mark which resulted in the department going under loss year on year. Mergers into other wings didn't yield the expected result and the loss accumulation continued. The distribution system maintained was deteriorating resulting in severe loss in power transmission. The loss of power through theft was very common. The legacy meters could be easily tampered by any local technician which resulted in meters running very slow or not running at all. Inadequate network of transmission resulted in overloads which resulting in frequent damages of transformers. Power was purchased at a high rate but there were no returns resulting in losses.

Finally, in 1999 it was decided to get private players on to clean the system and get the system back on track. The private party (TPDDL) and the Government shared in the ratios of 51% and 49% respectively. The licensees (TPDDL) were assured a 16% post tax return on equity invested in business. The licensees had a very difficult time in the initial days. There were very high losses, a very high number of new applications pending to be cleared, there are lot of metering, billing complaints to be resolved. There were not many options to pay electricity bill. Lack of coordination between the internal departments, poor infrastructure, unskilled / semi-skilled workers, no customer relationship management plagued the system.

The deep pocketed licensee bought a strong system with Managerial, financial, technical and consumer first approach. Under the managerial strategy, they bought a strong management to manage the system. A hierarchy of senior to middle level management was bought in to manage the zone-wise. These people were mainly used to address the current challenges and think of the futuristic approach. They were keen on analysing the environmental factors which may have positive or negative impact on the system. They tried to create a free, safe, secured and transparent environment by adhering to the financial policies, regulatory norms, Sexual harassment, code of conduct and whistle blower policies.

Under the technical upgradation, they bought in high end systems. Their goal was to reduce losses, increase profit, monitor, control and expand / create new infrastructure. They set up fault tolerant systems, increased vigilance on the operation and maintenance, set up 24 by 7 maintenance people. Improved the sub-stations which can heal themselves or inform the control room in case of any emergency. Under the customer centric approach, they introduced high end tamper proof meters, reduced power theft by installing systems which can alert in case the load on a particular line is high. Knowledge / awareness among the people that stealing power is a crime. To enhance the customer relationship, they bought in SMS services, increased payment systems where in customers can pay bills online / offline or at various other centres.

### Reforms by States

Every state is trying hard to attract investors to come and invest in their areas. GoI with DIPP together have launched an effort with World Bank to improve the EoDB in the states. There are various parameters like

- Business initiation
- land requisition, land allotment and construction
- maintaining the greenery in the vicinity and prevent any sort of pollution,
- labour laws with maintaining the minimum wages
- being compliant with the various types of taxation
- carrying out inspection
- enforcing the terms and conditions as agreed upon.

The states too have launched many programs to attract investors like in Karnataka (Global Investors Meet), Gujarat (Vibrant Gujarat), Madhya Pradesh (Invest Madhya Pradesh), Telangana (Global Investors Meet).

### Case study of Gujarat State

Gujarat is one of the leading urbanised state in the country. It is well connected by roads, railways, ports and air. It contributes to more than 7.5% of India's GDP and 18% of India's fixed capital. More than 10% of the country's factories are located here. Gujarat is a well-nourished state with its upper hand in many sectors like drugs, pharmaceuticals, dairy, cement, engineering, chemicals, petrochemicals, dairy, cement etc. The Government of Gujarat has a determined, futuristic vision to take the state to the next level. The Industrial Policy of Gujarat has come up with various steps / regulations which will help for the investors to set up their manufacturing units in a timely manner with less interventions from the Government. The rules and regulation have been setup in such a way that it should be a win-win situation for both the government and the investing party. Government of Gujarat has come up with various strategies like EoDB (land bank, procurement and allotment), enhancing the skills of the labour by providing required training, infrastructure development – finding the areas feasible for converting barren/ non usable land to some useful land, creation of jobs at various levels, providing stress on Research and development, providing a healthy environment – by increasing tax holidays, creating Special Economic zones, reducing tax burdens, providing international level visibility.

### Single Window System

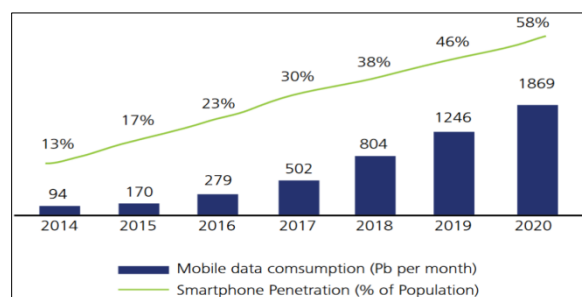
There is a single point of contact where the Investors need to file applications. There will be a dedicated department set up with Industries commiserate as a nodal office. The nodal office will have all the information required like the availability of land, environments, feasibilities, financial support, issues and concerns. This nodal office will also provide information on the questions if any, provide advisory based on their experience. Various departments' applications needed for each type of industry will be available under a single website. It will be responsibility of the nodal office to evaluate the application and coordinate with the departments needed. Collectors of each district will regularly conduct meeting and oversee the performance of the nodal office.

### Facilitation of Large/Mega Projects

Facilitating large infrastructure projects will have a rippling effect on other industries too. The upstream and downstream industries too will be benefitted. In case of upstream, it can be the raw materials providers, chunk products which will be used for the main product and in case of downstream, manufactured product can itself be a small part of big product. Government will provide large scale land at a convenient place which is feasible for development of the industry. Government will also provide the required resource, clearances from various boards, tax holidays and any other facilities required.

### Telecom Sector

Telecommunication growth is one of the key catalyst of socio-economic development. There were about 33.4 million new connections during the first half of FY 2015. The number of broadband connections too is increasing. Several factors have led to the growth of telecom industry like the economic liberation in 1991, various telecom reforms over the years, setting up of telecom regulatory policy, allowing FDI, private players in telecom sector and setting for Telecom Regulatory Authority of India (TRAI) in 1997. Setting up legacy wired network was a cumbersome task, had to get approval to dig road, laying cables, power connections, junction boxes etc and difficult to port from place to place. Setting up towers for wireless connections is much easier, flexible and portable. These telecom wireless networks have reached the remotest cities in India where even roads and railways which are decades old are yet to reach.



*Projected Smartphone Subscription and Mobile Data Consumption.  
Source: Analysis done by Deloitte. Published in their June 2015 paper.*

Wireless networks have increased exponentially in the subscriber base. Even in case of technology too, from voice calls, to 2G, 3G, 4G and more in the coming days. Mukesh Ambani's Reliance Jio which started its operations recently has tied up with high end infrastructure providers to provide seamless connectivity. Jio does not charge its customers for voice calls but charges only for its data subscribers. This is because of the 4G infrastructure where in all the voice calls will be routed through a dedicated express route. They have invested Rs 1 lakh crore on its infrastructure. Airtel, Idea, Vodafone are yet to

upgrade their systems to 4G. They are in the pre-mature phase as a huge investment is required to upgrade the infrastructure. Reliance Jio offer all its subscribers 4G data connectivity by default where as other subscribers still have 2G and 3G with 4G. When it comes to maintaining infrastructure, maintaining only 4G is much easier which is a upper hand for Reliance. Other service providers are failing here. Reliance have invested heavily on the Fibre optic network. USA has 80% of its network on fibre optic.

#### **Bharath Net (National Optical Fibre Network)**

Bharath Broadband Network Limited (BBNL) was set up by Government of India to setup, support and maintain the operation of National Optical Fibre Network. This would also help in the realisation of Digital India, in partnership with the state governments and the private sector. BBNL is a Special Purpose Vehicle formed under Companies Act. The project was initiated by the Go I to provide broadband connectivity to all the 2.5 lakhs gram panchayats across the country. This would help the broadband connectivity, Internet Service Providers (ISP), cable TV operators, and help in various services in rural areas like e-health, e-education, e-governance. The source of funding for this project was from United Service Obligation Fund (USOF) – the main motto of this organization is to provide telecom services in rural and remote areas of the city.

### **3. Conclusion**

India is a very vast country. With the population increasing day by day, it is very difficult for the Government to provide all the required infrastructure. There are various ways by which the Government has taken direct and indirect measures to provide infrastructure. Post the economic liberalization in 1991, the Government opened its doors for private players to come and invest in infrastructure. There are various models like BOT, DBO depending on the nature of investment, the private players can choose. Government will always try to be part with the private players which together form a SPV. The accounts of these investments are held in the form of Escrow accounts which ensures transparency between the various parties.

These private investments are already in the various fields like roads, railways, ports, telecom and various other sectors. The coming of private investors also helps to get the right technology, thinking, latest techniques, modern resources, high-end equipments. In turn, they too get the opportunity to get sufficient returns on their investments. Government also helps by providing various types of required help. There are already many projects which have been successfully executed with the help of private players. The current Prime Minister is heavily promoting the private player's participation. He has further stressed on the Make in India campaign to increase the exports and reduce the imports. We import more and export less. The MII campaign promotes people to become entrepreneurs and contribute in the growth of the country. Government has launched the concept of Smart city where in they have selected few cities to provide and improving the infrastructure at a much earlier stage of development. There are few of the various innovative ways to upgrade our infrastructure.

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