UNIT-I

Infrastructure: Definitions of infrastructure, Governing Features, Historical overview of Infrastructuredevelopment in India, Infrastructure Organizations&Systems Introduction.

Introduction

• I**nfrastructure** is the fundamental facilities and systems serving a country, city, or other area, including the services and facilities necessary for its economy to function.Infrastructure is composed of public and private physical improvements such as roads, bridges, tunnels, water supply, sewers, electricalgrids, telecommunications (including Internet connectivityand broadband speeds). In general, it has also been defined as "the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions".

Projectshaveamajorroletoplayintheeconomicdevelopmentofacountry. Sincetheintroductionofplanninginoureconomy,wehavebeeninvestinglargeamount of money in projects related to industry, minerals, power, transportation, irrigation, educationetc.withaviewtoimprovethesocio-economicconditionsofthepeople. Theseprojectsaredesignedwiththeaimofefficientmanagement,earningadequate return to provide for future development with their own resources. But experience shows that there are several shortcomings in the ultimate success of achieving the objectives of the proposedproject.

Infrastructure organization and system

To take part you must be employed by or volunteer for a local or regional infrastructure organization. By infrastructure organization, we mean civil society (third sector) organizations whose main or only purpose is to support the work of other groups in the local voluntary and community sector. This purpose will usually appear in the governing document of your organization or will be apparent from the work you have carried out. If supporting other organizations is not an explicit purpose in your governing document doing such work must be within the scope of the work your governing document allows you to do. Your infrastructure organization can be a registered charity a voluntary and community unincorporated charitable association〉 a community benefit society registered as an industrial and provident society a community interest company an organization of another type if you operate as a social enterprise and principally reinvest your surpluses for social benefit You are not eligible if your organization is a statutory organization such as a school or local authority, including statutoryorganizations that have charitable status your work and services provided are solely for individuals an individual or sole trader make a surplus or profit which is not principally reinvested for social benefit are applying on behalf of another organization.

An infrastructure organization generally have a number of key functions (e.g. from GAVCA) to enable the voluntary/community sector to identify, and appropriately meet, unmet〉needs and gaps in service provision (Development). To enhance the capacity of the voluntary and community sector by providing and〉promoting technical and practical support services (Support).To encourage networking, enabling the voluntary/community sector to share

knowledge, information and skills, and to promote liaison between the voluntary, public and private sectors (Liaison). To ensure effective and accountable representation of voluntary and community sectorviews and interests (Representation). To broker an effective role for the voluntary/community sector at a strategic level (Strategic〉 Partnerships). Examples of infrastructure organizations include a local CVS, a volunteer centre, local Voluntary Action provider or specialist local support and development organization.

Governing Features of Infrastructure

Natural Monopoly

When one firm can potentially supply market's entire demand for goods and services at most efficient price, it is said to exist natural monopoly. When the fixed costs become so large that only one firm can feasibly operate, and the average costs continue to fall over the entire range of production, the one firm will emerge as natural monopoly The production of certain goods and services are subject to scale economies- like Infrastructure facilities. The production of infrastructure facilities (like railways, electricity, telecommunications, gas-pipelines and other public-utilities) require a certain minimum scale of production. Natural Monopoly is often viewed as market-failure.

Sunk Costs

The expenditures that has already made and cannot be recovered even when the firm go out of business is called Sunk costs,it may be a barrier to entry into infrastructure development projects for private investors. If sunk costs are high relative to marginal cost, price will almost surely exceed marginal cost, even though economic profits are zero.Sunk costs should not be considered for future investments decisions Examples: telecommunication towers, sewerage, railways etc. have high sunk costs.

Non-Tradability of Output

Infrastructure output is the services that are evoked from the use of particular infrastructure facility. Thus the characteristics of services are equally applicable to infrastructure: intangible nature and non-tradability. This means that infrastructure services must be consumed or purchasedat the place they are produced. These services generally cannot be transported (with some exceptions). This characteristic has significant policy implications, because the viability of a particular infrastructure establishment has little role to play. For instance: roads, railways, bridges, airports etc. cannot be transported**.**

Non-Rival Consumption

Consumption by an individual does not affect the consumption by others. Thus an additional consumer can enjoy the benefits of consuming a good or service without conflicting the benefits of others. Zero marginal cost of providing the benefits of a good to an additional consumer. For instance: roads and telecommunication.

Price Exclusion

The benefits will be provided only to those who pay for the services/goods price exclusion is a feature of private goods.But, in the case of infrastructure, it will be very difficult to recover the costs of providing the facilities thus, pricing of infrastructure facilities are not regulated through market forces.

Externalities

Externalities are the spillover effects (costs or benefits) that are not included in the prices and accrue to other (third) parties than those involved in the transaction. For instance: health and education. Externalities are said to exist when production or consumption of an entity affect the productivity or well being of another entity. Two conditions are necessary for an externality

1. Interdependence between economic entities

2. Non-compensation for the effects of interdependence

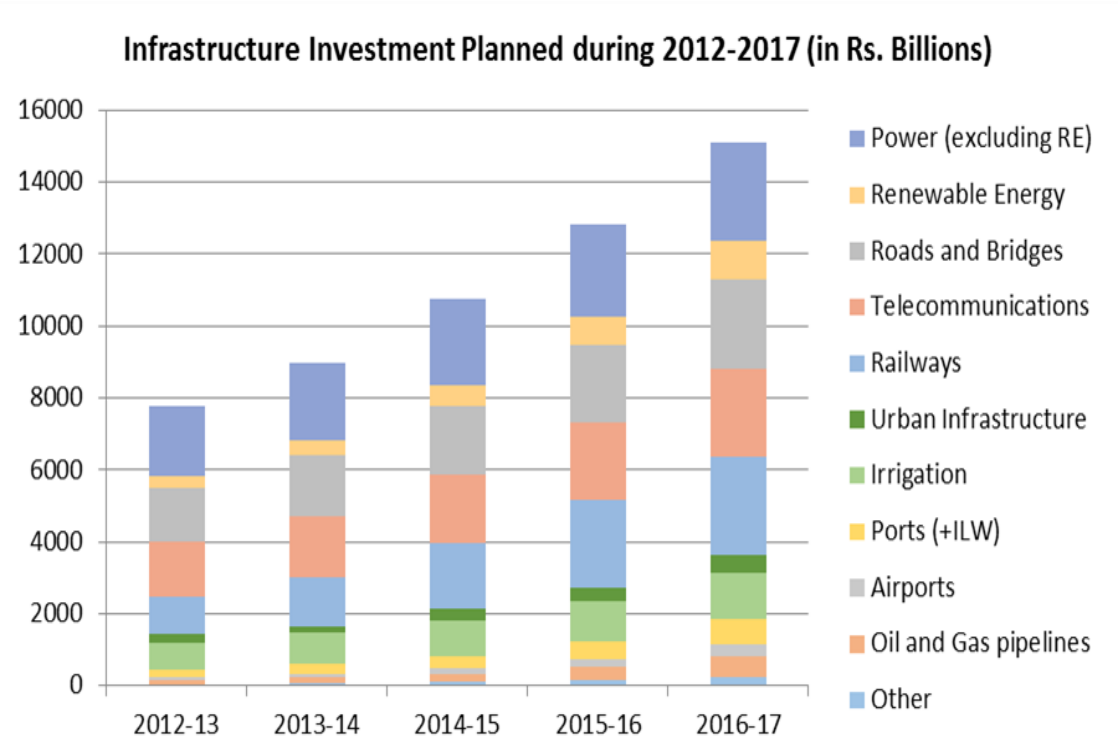
Two types of Externality:

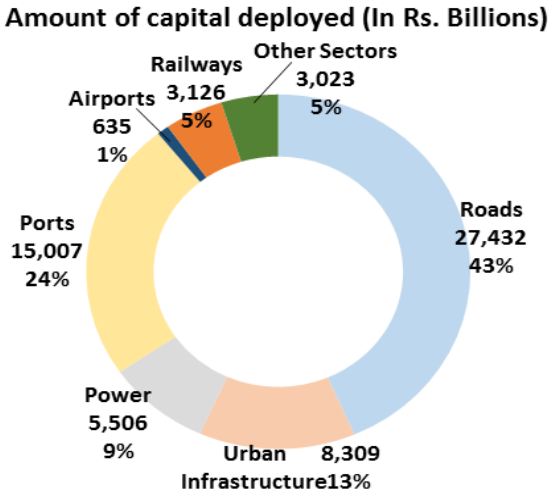
a) Positive externality b) Negative Externality

Infrastructure development in India

An analysis of the previous and present government plans reveal that Energy Security and Improving Connectivity (both physical and virtual) are emerging as the two major areas of infrastructure development in India. Recently, there has been a significant drive to emphasize on urban infrastructure (metro rail systems, sanitation, bus rapid transport systems, waste management and urban roads), renewable energy and connectivity (ports, railways)**.** Addressing these needs as well as the backlog that already exists in infrastructure development will be the prime focus for both the public and private sectors in the coming years.

The 12th Five Year Plan of the Government of India mentions a need for Rs. 56.3 trillion (about $ 1 trillion) for development of infrastructure. From the Five Year Plan, it can be noted (Figure 1) that the highest level of investment is planned in the Power, Roads, Telecom and Railway sectors.





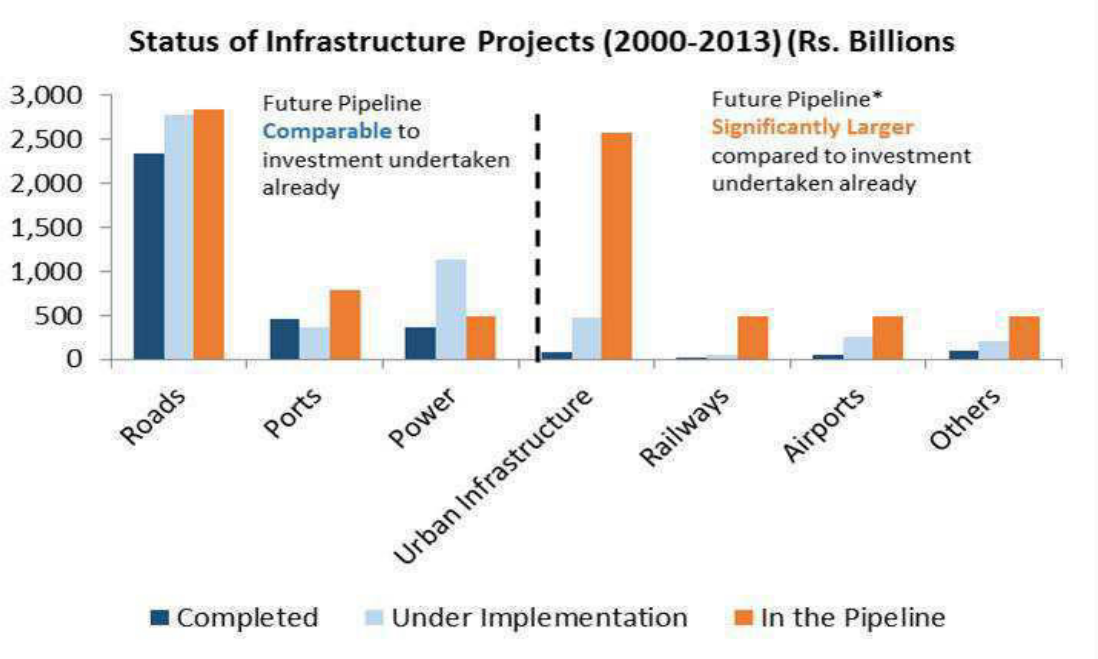
As can be seen from Figure 2, traditionally, greatest private participation in infrastructure development in India has been confined to the development of Roads, Urban Infrastructure, Power and Ports. Most Urban Infrastructure projects have been involved in building roads or commercial and residential complexes.

Roads have seen the greatest amount of investment in PPP mode since 2000. This is primarily because projects in Roads generally take lesser time, and the National Highway Authority of India prefers PPP as the preferred mode of investment in projects.

Incidentally, Roads, Power and Ports are the sectors that have allowed Foreign Direct Investment (FDI) since the mid-1990s and the financing of this infrastructure development has been carried out with active participation from both the public and private sector.

However, there is a changing need in the market, and evolving requirements of the population, which seems to be driving infrastructure development towards sectors that have primarily been the responsibility of the public sector. These sectors include areas like Urban Infrastructure (metro rail systems, sanitation, bus rapid transport systems and urban roads), Railways and Renewable Energy.

PPP investment in Urban Infrastructure to grow by 400%



Shows a snapshot of infrastructure projects that have already been completed, are under construction and are in the pipeline in various infrastructure sectors. Power projects have seen a drop in projects in the pipeline, as compared to projects that have been undertaken in the past. According to market source, issues plaguing the power sector as a whole, like coal block allocations lead to a large number of non-performing assets and are the primary reason behind a slowdown of investment in the power sector.

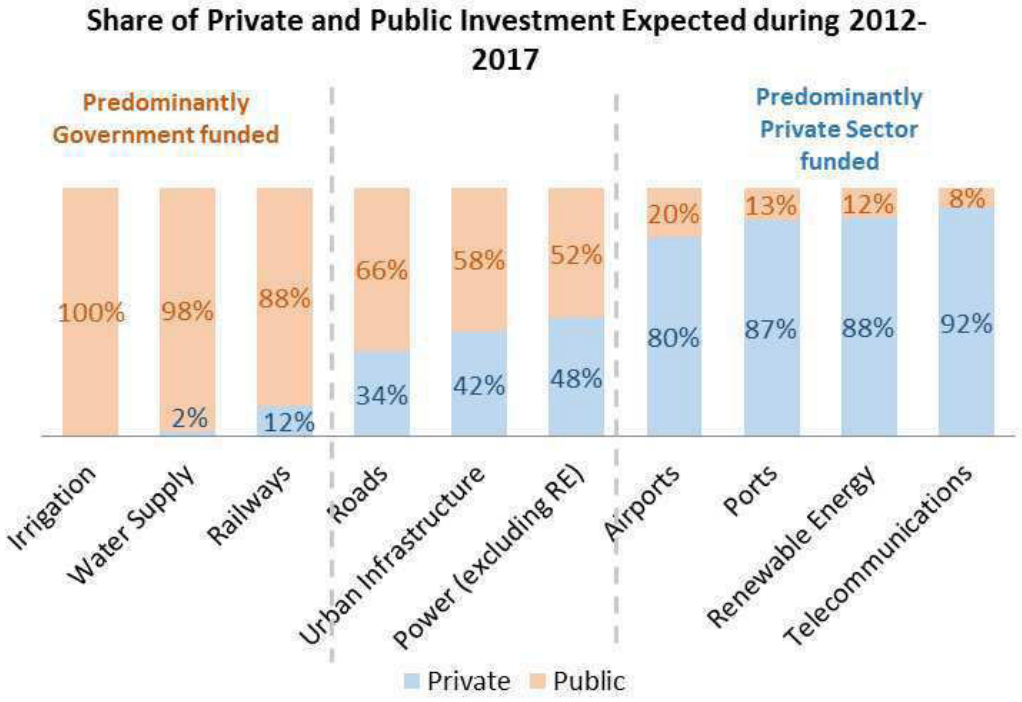
It is the sector of Urban Infrastructure which is expecting unprecedented growth in the amount of investment that has already been approved and is currently waiting for deployment (due to clearances, land acquisition, etc.). Urban Infrastructure presents the most striking contrast while comparing levels of past and future investments that are in the pipeline. Indian cities today are bursting at their seams (Delhi's population has grown from 9.4 million in 1991 to 18.7 million in 2011, nearly doubling in 20 years) and do not have the necessary infrastructure to cater to the needs of the increasing population density. Building adequate roads, flyovers, and more importantly, Mass Transit systems are on top of the priority lists of most state governments today. Another possible reason for this large spike in planned investment when comparing to investment that has already taken place, is that in many cases, Indian cities did not have adequate infrastructure to begin with. For example, out of the eight cities in India that have populations greater than 5 million (Delhi, Mumbai, Chennai, Kolkata, Bangalore, Hyderabad, Ahmadabad, Pune) only two have a functioning Metro Rail System. Urban infrastructure therefore emerges as the need of the hour.

Railways is the other sector in which the planned private sector investment as compared to the previously deployed investment is about to grow multi-fold in the near future.Even though the

Five Year Plan was formulated during the reign of the previous UPA government and Modi's NDA government may seem to have a starkly different outlook from their predecessors, interestingly, most of their thrust areas of infrastructure development continue to remain the same- Railways, Urban Infrastructure and Renewable Energy. However, there is a realignment of the role of the private sector in some areas. Already, telecommunications which had only a 41% share of Private investment planned during the Eleventh Plan Period has a 92% during the Twelfth Plan Period.

Public Funded Infrastructure Sectors to undergo major transformation

To meet the projected cost of developing this infrastructure, the Twelfth Plan suggests that 48% of the investment needs to come from the Private Sector, a significant increase from the 32% during the Eleventh Plan Period.In the past 6 months, one of the most significant policy changes has been the introduction of 100% FDI in Railways.



Previously, the introduction of 100% FDI in Telecommunications coincided with Telecommunications shifting from a sector that had comparable share of private and public funding (41% private funding) during the Eleventh Plan Period to a "Predominantly Private Sector funded" sector (92% private funding) during the Twelfth Plan Period.Something similar may happen in the Railways sector too. In fact, if the proposed plan for the introduction of

bullet trains goes ahead, this sector might see much larger investment from the private sector than the public sector.

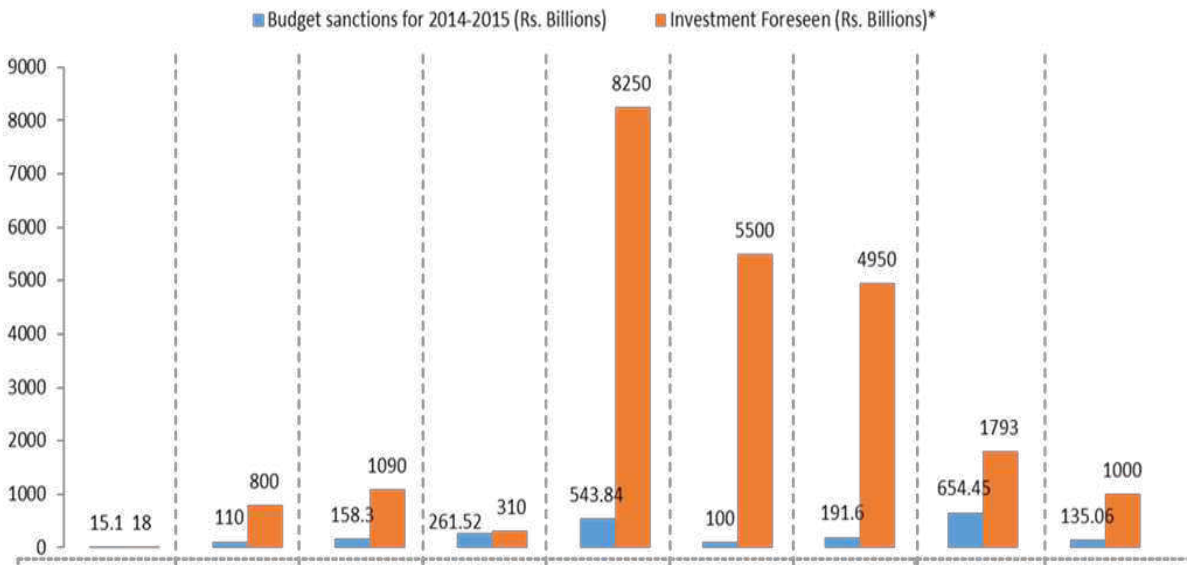
Other government pet projects involve ambitious plans for developing “100 Smart Cities”, reaching 100 GW of Solar Energy Generation by 2019, creation of a Digital India, encouraging infrastructure in Ports under the “Sagar Mala” scheme and the “Make in India” Campaign.

From the above data, it is clear that the two greatest areas of focus for the present government are

- Energy Security
- Improving Connectivity (both physical and virtual)

Water is still not seen as a priority area or as a component of Energy Security

- India has 16% of the world’s population and only 4% of the water. Already, India is a water-stressed state and it is expected to become a water-scarce nation by 2030. However, India does not recognize water security as a major concern yet.
- India needs to realize that even Energy security is heavily dependent on water security. Thermal and Nuclear power plants are the largest consumers of water in the industry and cannot operate without adequate water supply. Hydroelectric power generation is almost completely dependent on water availability. Despite that, water is not receiving its due importance in the present plans.
- A possible solution to this is encouraging the use of drip irrigation, which can be 80% less water intensive than flood irrigation, since agriculture accounts for roughly 80% of water use in the country.
- On the industrial front, Zero Liquid Discharge systems could prevent further pollution of existing water bodies as well as reduce water consumption. Already, the government has embarked upon a pilot project to introduce Zero Liquid Discharge plants in 45 factories along the banks of the Yamuna to study the impact.
- There are plans for linking all major ports to railways and mining hubs to facilitate smoother transport of coal as well as industrial freight. This is directly linked to the government’s aim to achieve energy security by improving movement of coal and oil.



	Irrigation	Water Supply	Ports	Roads	Power (excluding RE)	Renewable Energy	Urban Infrastructure	Railways	Telecommunications
Key Indian Players	Tata Power, Adani Ports, Bharti Airtel, Hindustan Construction Company, Mahindra Life Spaces, Jaypee Infra, Essar Ports, BHEL, Larsen & Tubro, Punj Lloyd, Lanco Infratech, NCC Ltd.								
Key Foreign Players		Veolia , Aqualyng AS	AP Moller Maersk, PSA Singapore, Dubai Ports World, Royal Boskalis	Jiangsu, PLUS Expressway Bcrhad Consortium, Hyundai ECCL, Isolux, Apollo	BP, Cairn Energy, Shell , BG Group, AES, CLP Holdings , GE Energy, Abellon Clean Energy,	Suzlon, Enercon, Vestas, RRB, NEG, Micon, Applied Materials	Hines , Tishman Speyer, Alstom, Hydro-Comp Enterprises , GIZ	EMD, GE, Siemens, Alstom	Vodafone,, Ericsson
Major Schemes Announced	Pradhan Mantri Krishi Sinchai Yojana	Ganga Clean -up	Sagar Mala				100 Smart Cities	Bullet Train	Digital India

- Investment anticipated in the coming 2-3 years, according to government sources (from private as well as public sector)

Note:

Foreseen investments is indicative of the amount the government expects to be invested

Foreseen investments are expected to occur over a period of 3-4 years