



## Need of infrastructure facilities for industrial development

Dr. Pramod Kumar Sinha

Designation - Assistant professor

Department of commerce.

P. R. College, Sonapur ( J.P. University, Chapra, BIHAR)

**Abstract:** The foundation of a modern economy is a robust industrial infrastructure. This is especially true in emerging economies, which are becoming the hub of infrastructure development and expansion. Infrastructure refers to the basic facility required to run the daily life of the citizen of a country or city like roads, bridges, tunnels, water supplies, sewers, electricity, gas, telecommunication system, cellular network, internet connectivity and broadband speed etc. Infrastructures are primarily classified into two broad heads namely, hard infrastructures like transportation networks like roads, airports, sea ports or river ports, railroads etc. and soft infrastructures like education system, healthcare system, law and order situation, financial system, form of government, financial service and government responses to the civil emergency etc. of a country. A holistic approach to industrial infrastructure takes into account the projected benefits and potential challenges as well as the milestones for the process from ideation to going on-stream. India is already on the path of rapid industrial infrastructure expansion, and the 'Make in India' initiative has added a new impetus to this expanding the nation's foundation for growth.

**Key words:** industrial Infrastructure, infrastructure sector, overhead capital, lumpy investment,

### 1. Introduction

A higher industrial growth supported by well-connected infrastructure facility is vital for India to maintain the momentum of higher sustainable economic growth. Moderation of industrial growth can be attributed to decelerated global economic growth, twin balance sheet problem and depressed private investment cycle. Meanwhile, the eight core infrastructure supportive industries have achieved reasonable growth in the same period. The idea that infrastructure investment is correlated with industrialization vis-à-vis economic development is appealing and intuitive. To imagine an economically developed

country without a substantial infrastructure is difficult. Infrastructure is directly related to productivity e.g. congestion takes a major economic toll as it slows movement of people and goods and impacts productivity. Good infrastructure attracts foreign investors. Effective infrastructure is vital for development of tourism and enhances Ireland's reputation abroad. Modern infrastructure creates employment opportunities and attracts skilled knowledge workers. To the World Bank (1994), the adequacy of infrastructure helps determining one country's success and another's failure – in industrializing, diversifying, production, expanding trade, coping with population growth or improving environmental conditions.



The Planning Commission of India has planned extensive expansion in the roads and highways, ports, civil aviation and airports, and power infrastructure segments – all of which provide substantial opportunities for E&C companies.

## 2. Scope of industrial related Infrastructure

The infrastructure sector covers a wide spectrum of services inter-alias roadways, railways, airways and water transport services, power generation including the transmission and distribution thereof telecommunications, port handling facilities, water supply and sewerage disposal, mass transport systems, and other elements of social infrastructure including medical and educational facilities and other primary services. While some of these sectors have direct impact on the workings of the economy others are important from the societal point of view and therefore need to be developed on a concurrent basis.

A very broad and comprehensive picture of components of infrastructure is observed in the analysis provided by Dr. V.K.R.V. Rao . The various components included in infrastructure in his analysis are as follows:

**Economic Infrastructure:** 1. Transport: Roads Railways Shipping ports and harbours Airports Transport Equipments.

**Communication:** a. Ports b. Telegraphs c. Telephones d. Radio e. Television f. Cinema etc

**Energy/Power:** a. Coal b. Electricity c. Wind power d. Solar energy e. Oil f. Gas

and Bio-gas **Intermediate goods and output:** a. Minerals b. Steel c. Metals other than steel d. Basic chemicals e. Fertilizers and pesticides f. Machinery and machine tools

**Increasing productivity of natural resources:** a. Reclamation of land b. Irrigation (Major/Medium/Minor) c. Drainage d. Contour building and land reshaping. e. Consolidation of holdings f. High yielding bovine varieties g. Fishing boats h. Fishing equipments and refrigeration i. Afforestation and development of commercial projects.

**Science and Technology:** a. Teaching basic and applied research b. National laboratories c. Liaison with production units

**Information system:** a. Mass Media b. Libraries and Museums c. Fairs and exhibitions d. Books and journals.

**Finance Infrastructure:** i. Finance and Banking a. Savings institutions (public private and co-operative sectors) b. Credit and lending institutions. c. Capital Markets

**Social Infrastructure:** 1. Human Resource Development: a. Health b. Clean drinking water c. Disease eradication d. Public hygiene e. Family Planning f. Medical facilities g. Education, Literacy h. Schools, Colleges and Universities i. Professional Education j. Technical and industrial schools k. Development disciplines

Thus, the scope of infrastructure is growing rapidly over time. The items to be covered in the term infrastructure are rather difficult. They differ from country



to country depending on the level of economic development. A country may go in for broader base of infrastructure development as development proceeds over the time periods.

### 3. Important Features of Infrastructure:

It is worthwhile to mention some distinctive features of infrastructure – First, the building of infrastructure requires large and lumpy investment and they contribute to output, after a long time that is their gestation period is quite long. Second, due to large overhead capital and lumpy investment, the significant economies of scale are found in most of them. Due to the significant economies of scale found in many infrastructure services, they have the characteristics of natural monopoly. The third important feature of infrastructure facilities is they create externalities. For example, building of rural roads will benefit agriculture as the farmers are able to sell their products in towns where they can get remunerative prices. Besides, they can get some inputs such as fertilizers, pesticides and other industrial products at relatively cheaper prices as their transport costs decline due to improved transportation. Power plants generate both positive and negative externalities. The construction of power plants produces electricity which is used for industrial helps production and commercial use and thereby helps in acceleration of economic growth. In many of infrastructural facilities, there are significant economies of scale and therefore they have the features natural monopoly. Therefore, these infrastructural facilities are either built or run by the government and public sector enterprises or if private sector is permitted to make investment in them

and run them, they need to be regulated by the government, so that they should not exploit the consumers.

### 4. Need of industrial Infrastructure:

Infrastructure contributes a lot for the development of backward regions and removal of regional imbalance. Infrastructure facilities act as an instrument of social change. Development of industry, transport facilities, education, science and technology, growth of towns and cities etc may change the very outlook of the society. The pressing need of keeping pace with the globalised scenario and the increasing progress of technological innovations, coupled with paucity of much needed resources and innovations in the country highlights the need for better infrastructure.

Availability of good infrastructure is a key to industrial development. The organic link between infrastructure and industrialization is one area of economics that is incontestable. Globally, there is a strong body of evidence that confirms that there is an extremely strong nexus between a robust infrastructure and increased levels of industrial activity. Infrastructures, directly or indirectly affect the efficacy and competitiveness of every critical economic and social activity. Such activities include agriculture, manufacturing, research and development, to mention but a few. Infrastructure plays a crucial role in the development of nations, whether developed or developing. They provide the basic foundation on which the superstructure of growth and development can be erected. Obviously, if the infrastructural facilities are



adequately provided, industrialization is not only easily attainable but it is also continuous, stable, quantitative and qualitative. In Rostowian language, a take-off into self-sustaining growth is not only possible but it is also assured and cumulative (Jhingon, 1997).

Investments in infrastructure generally fall into four broad categories: utilities, communication, transportation and land development. Most infrastructure investment can positively affect industrial activities in three ways. First, it can reduce the cost of production. Second, it can increase revenues. It can increase employment through both direct and indirect effects.

It needs to be emphasized that good quality infrastructure is important not only for faster economic growth but also to ensure inclusive growth. By inclusive growth we mean that benefits of growth are shared by the majority of the people of a country. Thus the inclusive growth will lead to the alleviation of poverty and reduction in income inequality in the country.

For example, micro, small and medium enterprises (MSME) are dispersed throughout the economy and production by them and their growth require access to quality and reliable infrastructure services to compete efficiently with large-scale enterprises which can often build some of their own infrastructure such as installing their own small power plants or generators. Besides, large-scale firms can even locate themselves near ports and near transport hubs where required infrastructure is available.

Small enterprises, on the other hand, are dispersed widely in the economy and have

to rely on the availability of the general infrastructure facilities. Thus, by building up general infrastructure facilities helps the small enterprises to compete successfully with large-scale industries and being labour-intensive generate large employment opportunities for the workers. This will help to alleviate the poverty in developing countries.

The expansion in infrastructure facilities such as irrigation, rural electrification, roads and road transport will promote agricultural growth and setting up of agro-processing industries. These general infrastructure facilities will help farmers and owners of processing industries to get their requirements of raw materials, fertilizers and other inputs at cheap rate and also help them to bring their products to the markets which are located in big towns and cities.

Thus, according to Thirlwall, "For poor farmers improved infrastructure will reduce their input cost and increase agricultural production and reduce traders' monopoly by improving their access to markets. Nearly two-thirds of African farmers are cut off from national and world markets, because of poor infrastructure and market access. Better transport means greater access to public resources including schools, hospitals and other health facilities".

It follows from above that the expansion of infrastructure facilities will ensure sustained growth of employment in agriculture and small-scale rural industries and bring prosperity in the rural areas and in this way ensure inclusive growth. Besides, this will also help to prevent the mass exodus of the rural people to urban areas where they



cause problems of urban congestion, growth of slums and acute housing shortage.

Lack of adequate infrastructure not only holds back economic development, it also causes additional costs in terms of time, effort and money of the people for accessing essential social services such as healthcare and education. Emphasizing the importance of adequate infrastructure, authors of Economic Survey of India for the Year 2013 -14 quite rightly write, "Rural economic growth in recent years has put enormous pressure on existing infrastructure particularly on transport, energy and communication. Unless it is significantly improved infrastructure will continue to be a bottleneck for growth and obstacle to poverty reduction". In other words, it is the challenge to ensure strong, sustainable and balanced development through integration of the economy with environmentally sustainable development of infrastructure.

The availability of good quality infrastructure raises productivity levels in the economy and brings down costs of the enterprises. Besides, the availability of adequate infrastructure helps to expand trade not only within a country by improving transport facilities but also promote foreign trade through improvement of ports and airports. It also helps to diversify production by the firms as they are able to get the required supplies of raw materials and other inputs from the places where these are available in abundance. Furthermore, with improved infrastructure the firms can produce goods in accordance with the

demands of the people of different regions and countries.

Education is an agent of nation building as well as an instrument of technological progress and industrial development. Ukpong (1979) regards investment in education as investment in human resources which has been discovered as a factor of industrial and economic growth both in developed and developing countries. It is generally believed that one of the key factors in the development process is the human element because it is this „human element that is the dynamic decision making factor that develops natural and capital resources as well as the human factor itself“ (Ukpong, 1991). Education which develops the human factor serves not only as an agent of social transformation but also as a unique factor in promoting industrial and economic development.

From the foregoing analysis, it is clear that the existence of appropriate infrastructural facilities is a pre-requisite for industrial development and hence general economic growth. Providing adequate infrastructure to drive industrial activity vis-à-vis economic activity has also been a major reason for the occurrence of the East Asian miracle; when countries in the region attained and sustained double-digit gross domestic product (GDP) growth rates for several years in the 1990s. It is in the recognition of the vital role of infrastructure in the development process, government in developing countries have allocated large proportions of their capital expenditures to the development of infrastructural facilities.



A. Economic infrastructure is the nerve centre of the economic system. It plays an important role in the development of not only the economy but of the civilization as well. It is a public utility service which gives place and time utility to goods and services. They link production, distribution centres and the end consumers as well. Therefore, infrastructures bring together the elements of the economic system.

To conclude, let us discuss some of the prime importance of infrastructures.

i. They help in the development of the market and all the elements within.

ii. It also facilitates large-scale production for the purpose of smooth functioning of the economy.

iii. They result in the territorial division of labour which is great.

iv. They also ensure price stability in the market.

v. Economic infrastructure definitely ensures the mobility of labour and capital within/from the economy.

vi. It results in the overall growth of towns and cities.

vii. Infrastructures provide for a lot of employment generation and employment opportunities.

viii. They also play a crucial role in national defence activities.

ix. Infrastructures in the economy directly result in the unity of various economic components.

x. The economy and the nation will be able to meet any emergencies that arise.

xi. It creates a place and time utility.

xii. Infrastructural development plays a vital role in the development of agriculture and industry.

xiii. Infrastructure like transportation, communication and telecommunication breaks any economic isolation that prevails in the country.

xiv. They are a great and rich source of revenue to the Government.

xv. The development of economic infrastructure will directly result in the development of economic trade.

#### 5. Significance of industrial infrastructure

According to Dr V. K. R. V. Rao, "The link between infrastructure and development is not a once for all affair. It is a continuous process and progress in development has to be preceded, accompanied and followed by progress in infrastructure; if we are to fulfil our declared objectives of a self-accelerating process of economic development". Discussed below are some of the most critical significance of industrial or economic infrastructure and its impact on the economy.

**The smooth functioning of the economy.** Infrastructural facilities are very necessary and vital for the smooth functioning of the economy. They are like wheels of development without which the economy will not be able to function properly.





- **Development of agriculture.** The development of agriculture, to a considerable extent, depends on the adequate expansion and development of irrigation, credit, transport, power, marketing, training and education. It also depends on the improvement of research and development and other such facilities.

- **Development of industry.** Industrial production requires not only machinery and equipment but also requires the following: Energy, skilled manpower, management, banking, insurance and transportation services are crucial. These activities and facilities will directly lead to the development of the industrial sector of the economy.

- **Promotion of investment.** Infrastructural development is definitely a pre-condition for increasing economic investments. Those areas with the sound infrastructural base may succeed in attracting all the more capital for investment.

- **Improvement in productivity.** Infrastructural development such as transportation facilities and education increase the productivity. Development of science and technology is also important in improving the economic productivity. Moreover, research and development also play a critical role in economic improvement.

- **Employee generation.** Infrastructures play a crucial role in the generation of employment opportunities. They improve mobility, efficiency and productivity of labour. Moreover, larger investment, development of industry and agriculture create all the more employment opportunities.

a) *Some of the secondary but essential significance of the economic infrastructure are as follows.*

**Development of backward regions.** The development of backward regions and the removal of regional imbalances is yet another significant contribution of infrastructural facilities. The lack of infrastructural facilities in the backward regions will act as a constraint on the development of those regions.

**Social change.** Infrastructural facilities will also act as an instrument of social changes. Development of industries, transport facilities and education will change the outlook of people. Apart from these, even science, technology and growth of towns and cities will lead to a changed economic outlook.

**The growth of GDP.** There exists a very close relationship between spending for infrastructure and GDP growth. Studies reveal that 1% growth in the stock of infrastructure often associates with 1% growth in per capita GDP.

**All round development/Overall development.** Infrastructural development is important not only for economic growth but also for the overall development. The all-round development of the country and economy is crucial. Infrastructural facilities are also necessary for technological innovation. Along with technological innovation, economic infrastructural facilities are also important for the eradicating poverty and enhancing globalization.

#### **6. Common Problems Associated With Building industrial Infrastructure:**

- **Scale and Time:** The most obvious problem is that infrastructure



projects are built on a very large scale. Hence they require a lot of investment. A lot of these projects are not viable when they are started. However, once they are built they do become economically viable. In fact, they raise the economic standard of the surrounding areas as well. Also, infrastructure projects tend to take a lot of time. They cause a lot of inconvenience to the population while they are being built. The problem with infrastructure is that places that need it the most do not have the funds to make it.

- **Capacity Planning:** As mentioned in the above point, infrastructure building requires a lot of time. Hence, by the time the project is completed, the situation may have changed completely. For instance, if a road needs to be built between two towns, the number of lanes is decided based on the current amount of traffic that is flowing between the cities. Some adjustments are made to account for the possibility of increased traffic. However, in many cases, traffic increases manifold. It is not possible to foresee where people will live or travel in the next few years. Hence, capacity planning for infrastructure is actually an imperfect art.

- **Balanced Growth:** it is very important that the focus is on the balance between different types of infrastructure which are necessary for the economy. For instance, if an economy builds lot of high speed roads but neglects telecommunications entirely in the process, the economy will not benefit. Each country must realize its competitive advantage and build infrastructure accordingly. Consider the case of small countries like Liechtenstein. Their economy is entirely dependent upon banking. Hence, they focus more on building banking and telecommunications infrastructure than

they focus on building roads. On the other hand manufacturing hubs like China and Germany build more roads, ports and airports.

- **Regulatory Uncertainty:** Infrastructure projects require governments to hand over a lot of resources to private parties. A lot of times such privatization is opposed by other stakeholders. Also, the regulators tend to be very powerful in infrastructure development. This is why private companies are not generally interested in entering this field unless the government provides a deal sweetener in the form of lower taxes. The problem is that these tax rules are also arbitrary. In developing countries, the on-ground execution of infrastructure projects is filled with corruption. Public-private partnerships help in mitigating these uncertainties to some extent. However, the implementation of infrastructure projects is still an uphill task given all the challenges.

- **Ecological Issues:** Modern society is constantly torn up between high speed growth and preservation of the environment. This problem is faced mainly by infrastructure groups. Each time a new highway or airport needs to be built there are protests from environmental activists. The solutions to these problems are not easy by any means. This is because these problems are not logistical but instead political in nature. Hence, they need to be solved by consensus building. The problem is that consensus building tends to take a lot of time. The passage of this time leads to cost escalations and compounds an already severe problem.

- **Paucity of Funds:** There are always more infrastructure projects that need to be undertaken than the government has funds. There is a limit to





what the taxpayer can pay. Hence, a lot of these projects are built using infrastructure finance from foreign institutions like the World Bank. However, it is essential that only self-sustaining projects are funded through debt. Otherwise, incessant spending on infrastructure building has led to the bankruptcy of many nations.

### 7. Industrial Infrastructure in India

Industrial Infrastructure in India is greatly supported by the initiative of the local and central government and foreign investors. The sectors which are most in demand for the development of Industrial Infrastructure are like the construction, health, engineering, textile, and others. The government has undertaken strong development policies that promote growth in infrastructure projects for the improvement of living conditions of the people. In India, the entire range of circuit breakers from bulk oil, minimum oil, air blast, vacuum to SF6 are manufacture to standard specification for the benefit of customers. Similarly regarding the construction industry the government along with foreign investors are spending on the growth of the construction of Industrial Infrastructure. For instance, in Tamil Nadu some infrastructure projects have come up like the US\$7-8bn India-Iran gas pipeline, the US\$2.8bn construction of two power plants and the US\$2.3bn power project. Other essential items for the growth of Industrial Infrastructure are like motor control systems based on microprocessor and computer control, which is required for power stations, load dispatch centers, major receiving centers, and industrial complexes.

Another sector which has a major contribution for the Industrial Infrastructure is the mining industry and mining equipments like Longwall Mining Equipment, Road Header, side Discharge Loader (SDL), Haulage Winder, Ventilation Fan, Load Hauldumper (LHD), Coal Cutter, Conveyors Battery Loco, and Pumps are in great demand. For development in Industrial Infrastructure, the government is taking initiative in upgrading the production of sophisticated machines so as to cater to the rising requirements of the Indian economy. In the health care segment, over the last five decades, India has built up a vast health Industrial Infrastructure and manpower at primary, secondary and tertiary care in all sectors. Currently, private sector health services range from those provided by large corporate hospitals, smaller hospitals, nursing homes to clinics all well-equipped and furnished with infrastructural facilities.

### Conclusion

Infrastructure is important because we all pay for it and we all use it. Paying for infrastructure can be as complicated as the infrastructure itself. Nevertheless, most people depend on transportation systems and public utilities, which also are essential for the economic vitality of our businesses. For the last few years India has enormous growth in **industrial and infrastructure** sectors, both Government and private have invest heavily after 1991 economic policy has introduced mostly the private sectors have brought in world standard techniques and technology in this industries. After 1991 policy FDI (Foreign Direct Investors) enter directly and indirectly into the industries, with the help of them India got money and



equipment to build and to become one of the highest spenders in industrial and infrastructure. Steps taken for infrastructural development IIFC - India Infrastructure Finance Corporation. Setup to fund infrastructure funds in India & is owned by government. **Infrastructure inadequacies** in both rural and urban areas are a major factor constraining India growth. India needs a lot more infrastructure to meet its needs. The government is focusing on this and has created a set of programs and reforms aimed at addressing this issue.

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