

THE ROLE OF ECONOMIC AND SOCIAL INFRASTRUCTURE IN ECONOMIC DEVELOPMENT: A GLOBAL VIEW

DR. SANGAPPA V MAMANSHETTY

Abstract: Infrastructure is the prerequisite for the development of any economy. Transport, telecommunications, energy, water, health, housing, and educational facilities have become part and parcel of human existence. It is difficult to imagine a modern world without these facilities. These are vital to the household life as well as to the economic activity. Infrastructure plays a crucial role in promoting economic growth and thereby contributes to the reduction of economic disparity, poverty and deprivations in a country. Greater access of the poor to education and health services, water and sanitation, road network and electricity is needed to bring equitable development and social empowerment. It is an important pre-condition for sustainable economic and social development. Infrastructural investments in transport (roads, railways, ports and civil aviation), power, irrigation, watersheds, hydroelectric works, scientific research and training, markets and warehousing, communications and informatics, education, health and family welfare play a strategic but indirect role in the development process, but makes a significant contribution towards growth by increasing the factor productivity of land, labour and capital in the production process, especially safe drinking water and sanitation, basic educational facilities strongly influence to the quality of life of the people. This study establishes the relationship between infrastructure and economic growth using growth theories by empirical evidences. Finally it concludes infrastructure and poverty reduction in the Indian context.

Keywords: Infrastructure, Growth and Development, Infrastructural Investments, Poverty Reduction

Introduction: Infrastructures are basic essential services that should be put in place to enable development to occur. Socio-economic development can be facilitated and accelerated the presence of social and economic infrastructures. If these facilities and services are not in place, development will be very difficult and in fact can be likened to a very scarce commodity that can only be secured at a very high price and cost. The provision and development of infrastructures has been the subject of much theoretical analysis and empirical studies. We shall start by examining some of the theoretical analyses of socio-economic infrastructures.

These are vital to the household life as well as to the economic activity. Infrastructure plays a crucial role in promoting economic growth and thereby contributes to the reduction of economic disparity, poverty and deprivations in a country. Greater access of the poor to education and health services, water and sanitation, road network and electricity is needed to bring equitable development and social empowerment. It is an important pre-condition for sustainable economic and social development. Infrastructural investments in transport (roads, railways, ports and civil aviation), power, irrigation, watersheds, hydroelectric works, scientific research and training, markets and warehousing, communications and informatics, education, health and family welfare play a strategic but indirect role in the development process, but makes a significant contribution towards growth by increasing the factor productivity of land, labour and capital in the production process, especially safe drinking water

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Theoretical Framework: Strategies Of Development: Doctrine of Unbalanced Growth According to the theory of unbalanced growth (UG) by Albert O. Hirschman, noLDC has sufficient endowment of resources as to enable it invest simultaneously in all sectors of the economy in order to achieve balanced growth. Balanced growth is a doctrine previously advanced by Rosenstein-Rodan in his 1943 article on "Problems of Industrialisation of Eastern and South-Eastern Europe" and developed by Ragnar Nurkse in his important study of Problems Of Capital Formation In Underdeveloped Countries Developing Robstown's leading sector thesis, Hirschman maintains that "investments in strategically selected industries or sectors of the economy will lead to new investment opportunities and so pave the way to further economic development". Hirschman identified convergent and divergent series of investments. Convergent series of investments are those projects that appropriate more external economies than they create while divergent series create more external economies than they appropriate. Jhinghan says that development policy should aim at the prevention of convergent series of investments and the promotion of divergent series. Thus, for development to take place, a deliberate strategy of unbalancing the economy should be adopted. "This is possible by investing either in social overhead capital (SOC) or in directly productive activities (DPA). Investment in SOC is advocated not because of its direct effect on final output, but

because it permits and in fact invites DPA to come in... Some SOC investment is required as a prerequisite of DPA investment". In India, Russia and Nigeria, to mention a few countries, this growth strategy of massive investments in such SOCs as power, irrigation, transport, communications, energy, education and health has been pursued.

The Wage-Goods Strategy: The wage-goods strategy of development was formulated by C.N. Vakil and P.R. Brahmanand in a book titled *Planning For An Expanding Economy* in 1956. Their strategy is an "extension of the Nurkesian thesis of concealed saving-potential in rural disguised unemployed". In LDCs, Vakil and Brahmanand felt that an effective use could be made of the 'saving-potential' by employing the disguised unemployed at the project sites by supplying them with wage-goods defined as "consumption necessities required for subsistence and performance of work". Capital goods required for the production of these wage-goods should be accorded priority in production and the supply of wage-goods plus capital goods needed for their production must grow at a considerably higher rate than the growth rate of population to absorb the disguised unemployed". The implementation of this strategy embraces starting economic overheads in rural areas, investing in them, providing wage-goods to workers and mobilization of savings. Even though this strategy was formulated for India, it is an attempt to build an analytical scheme for solving the triple problems of unemployment, poverty and inequality. It is akin to the concepts of Community Development and Integrated Rural Development. In our view, this strategy can be generalized as follows: Development requires the mobilization of surplus labour to generate both urban and rural capital in the form of economic and social infrastructures.

Vent for Surplus: Theory this model was developed by Hla Myint. Since countries generally operate inside their production possibilities curve, they are producing at less than full capacity. Thus, under capacity utilization of resources, especially labour, is a major characteristic of countries, especially LDCs. The logic is that the unemployed resources can be mobilized to produce goods and services, both public and private, to push the economy closer to, or on its production-possibility frontier. In this way, growth can be promoted through a more efficient utilization of societal resources. Within the context of this paper, the vent for surplus is in the form of mobilization of surplus labour, the open and the disguisedly unemployed; to expand the stock of economic and social infrastructures in the less developed economies, especially. Civic works by the military can also be viewed from this perspective.

Privatisation and Commercialisation: Theory Privatisation and commercialisation strategy is a

latter-day form of the *classical laissez-faire* policy or strategy of development. The concept embraces deregulation of the economy so as to encourage private initiative and boost productivity and efficiency. The key elements are the "disengagement of government from the ownership of hitherto state-owned enterprises (SOEs) and the concomitant sale of such to private entrepreneurs". The organized private sector becomes the driving force or the engine of development and growth while the government's role is reduced to that of a catalyst responsible for the creation of an enabling environment for the growth of the economy. From a global perspective, this is a strategy of development through a more efficient pattern of resource allocation by a free interplay of market forces. Deregulation encourages competition and in this way, a greater quantum of economic and social overhead capital or infrastructures will be built up in a more efficient and competitive market environment. This is the strategy of the new millennium as governments try to shed their economically inefficient and unproductive overloads to generate more revenue from the sale of the SOEs. This, expectedly, would enable the governments, especially LDC governments, to reduce their public expenditures, generate more revenue and balance their budgets, at least. The disposal of the economic infrastructures and parastatals would enable these governments to focus more attention to and fund more adequately the social parastatals and infrastructures that create substantial external economies through the provision of public goods such as health, education, sanitation, portable water, and etcetera.

Role of Economic Infrastructure: Economic infrastructure has played a very significantly positive role in the growth performance of countries in recent times. Where development of economic infrastructures has followed a rational, well-coordinated and harmonised path, growth and development has received a big boost. Examples are Korea and Japan. Where the growth of infrastructures has not followed such a rational and coordinated path, growth and development has been stunted. Examples can be found in most African countries and other LDCs. In a paper on 'Evaluating Investment on Basic Infrastructure in Nigeria', B.E. Aigbokhan gives examples of economic infrastructure as public utilities such as power, telecommunications, piped water supply, sanitation and sewage, solid waste collection and disposal and piped gas as well as public works which include roads, major dam and canal works for irrigation and drainage, and other transport projects like urban and inter-urban railways, urban transport, seaports and waterways and airports.

Aigbokan further writes that “public infrastructure does three things:

1. It provides services that are part of the consumption bundle of residents;
2. Large-scale expenditures for public works increase aggregate demand and provide short-run stimulus to the economy; and
3. It serves as an input into private sector production, thus augmenting output and productivity. The provision of economic infrastructure can expand the productive capacity of the economy by increasing the quantity and quality of such infrastructure. The transformation curve or the production possibility frontier or curve would shift with the expansion of the economic infrastructural base, thereby accelerating the rate of economic growth and enhancing the pace of socio-economic development. Improvements in maintenance- the so-called maintenance culture-would enhance the quality of existing infrastructure and give rise to a 'vent for surpluses.

The development of such gigantic projects as railways, road, transport, telecommunications, gas, electricity, irrigation works, et cetera “entails large investments which are beyond the capacity of private enterprises” in LDCs. Beyond that, their privatization for enhanced performance and accelerated growth has not met with a high degree of success in most LDCs. Consortia buying the SOEs, such as NITEL in the telecommunications sector in Nigeria, have not found it easy to raise the funds to buy the majority ownership shares.

If they cannot buy majority shares into existing SOEs, it is needless to say that they cannot muster the resources necessary to compete with the existing government-owned parastatals. It is such competition really that can ensure an effective deregulation of the economy, with the dividends of such deregulation accruing to the citizens or masses of such countries. Otherwise, mere ownership changes cannot bring about the necessary panacea and relief to such economies. If maladministration and mismanagement are the problems of the SOEs, it is perhaps prudent to allow management contractors, with some equity ownership making them stakeholders, to run them for government or lease them for specific negotiated periods. Better management of economic infrastructure would have positive output, income and employment effects on the economy. Moreover, it will impact directly on the poor, thus reducing poverty. Greater supply elasticity of goods and lower production costs of DPAs should have an anti-inflationary effect. With domestic price levels falling, such an economy's export competitiveness in international trade will ensure an

improved balance of trade, balance of payments, and less foreign debt burden.

The Role Of Social Infrastructure: Social infrastructure has enormous externalities. Education and health are social goods in which social marginal productivity (SMP) exceeds private marginal productivity (PMP). Therefore, private investment capital in such social infrastructure is likely to fall far short of what is needed. In that case, it is imperative for the state to provide the finance and other complementary resources for the take-off of such social infrastructural projects. The state does not necessarily have to operate or manage a social infrastructure, but it is necessary for the state to provide guidelines for and monitor its operation.

Education is a very important source of economic growth as the Denison study shows. Even though education may be a social investment, it is also an economic investment since it enhances the stock of human capital. Denison's conclusions on the economic contribution of education may be summarized in his own words: From 1929 to 1957 the amount of education the average worker had received was increasing almost 2percent a year, and this was raising the average quality of labour by 0.97 per cent a year, and contributing 0.67 percentage point to the growth rate of real national income. Thus, it was the source of 23 per cent of the growth of total real national income and 42 per cent of the growth of real national income per person employed....Despite the controversies surrounding the contribution of human resource development to economic growth, it is clear that “programs of human resource development must be designed to provide the knowledge, the skills, and the incentives required by a productive economy”.....Human resource development may be a more realistic and reliable indicator of modernization or development than any other single measure. It is one of the necessary conditions for all kinds of growth – social, political, cultural or economic”.

Thus, economic development is not possible without education and investment in human capital which is highly productive. Jhinghan quotes Galbraith as concluding that “that something is both a consumer service and a source of productive capital for the society does not detract at all from its importance as an investment. Rather it enhances that importance”.

Therefore says Jhinghan, “it devolves on the state to initiate a long-term programme of educational expansion and reform on a broad front stretching from literacy drive to the university level, so that in all branches of national life education becomes the focal point of a country's development”.

The deregulation of the educational sector to allow for private sector participation is a trend in the LDCs. It has long been so in the developed economies of Europe and North America. It has the potential of

augmenting the number of educational institutions thus enhancing the capacity of the system to meet the adequacy and accessibility requirements of the society. However, affordability of privately – provided education is elusive to the vast majority of citizens and, as such, public education at all levels is an imperative need. While public education cannot be free if it is to be qualitative, reasonable user-charges can be imposed in public educational institutions with governments at all levels, local, state and federal standing ready to award full or partial scholarships to the needy.

The role of education as a social infrastructure and as a stimulant of growth and development can be enhanced only if it is qualitatively provided. Qualitative education is a major determinant of the stock of human capital. A less developing economy needs professionals in all sectors to accelerate the growth and development of such sectors. In fact, UNESCO recommends a minimum of fifteen per cent of national expenditures on education. Some advanced countries spend more than 5% of their GDPs on education and yet, education still remains in the front burner of national debate on their development priorities. Health, like education, is a very important argument in the socio-economic production function.

A popular adage says that a sound mind usually resides in a healthy body. Health is one of the major determinants of labour productivity and efficiency. Again, since health as a social good provides externalities, large-scale health facilities can only be provided with public resources. Public health deals with the environment in which economic activities take place. If that environment were conducive, it would be permissive of accelerated growth and development. “Public health measures include the improvement of environmental sanitation both in rural and urban areas, removal of stagnant and polluted water, slum clearance, better housing, clean water supply, better sewage facilities, control of communicable diseases, provision of medical and health services especially in maternal and child welfare, health education, family planning and above all, for the training of health and medical personnel”.

The Human Development Index (HDI) of the United Nations Development Programme (UNDP) was devised in the early 1990s to measure the level of human deprivation and development. The HDI ranges between 0 and 1. An HDI of less than 0.5 implies a low level of human development while $0.5 < \text{HDI} < 0.8$ implies medium level of development. An HDI > 0.8 implies a high level of development. According to the 1996 World Development Report, Nigeria's HDI was 0.4, for example. Out of the 174 member countries, Nigeria ranked 137 on the HDI scale. This implies that

life expectancy was low, with about a third of the population not enjoying health services, two-thirds of the population not having access to safe water and sanitation and 47.5% of the population being educational illiterates. The HDI is an average or aggregative index concealing a great deal of regional, gender, ethnic and social disparities. This means that human conditions in some regions of the country are worse than that painted above. Since the Nigerian case is typical of most LDCs, particularly in Africa and Asia, the challenge of human development is enormous. This requires a lot of policy focus and attention and an application of significant and rising proportion of the country's national expenditures to the formation of social infrastructural capital

Empirical Studies: The role of social and economic infrastructure is a very wide and controversial issue that has been the subject of numerous empirical studies. Our effort here is a limited one confined to an overview of relevant empirical work contained in Aigbokhan, Cesar Queiroz and Surhid Gautam, and Olukoju.

Basic Infrastructural Studies: Aigbokhan submits that studies have found that as an economy grows, its infrastructural capacity grows. That is, infrastructure capacity grows step by step with economic output”. The World Development Report published in 1994 is cited as showing that “a 1 percent increase in the stock of infrastructure is associated with a 1 per cent increase in the Gross Domestic Product across all countries. And as countries develop, infrastructure must adapt to support changing pattern of demand, as the shares of power, roads, and telecommunications in the total stock of infrastructure increase. As the economy develops, an increasing proportion of the country would need to be opened up by the construction of roads, there would be increased demand for power supply for industrial and domestic consumption, and telecommunications facilities. Studies have therefore found that poor countries record low stock of infrastructure”.

The empirical evidence shows that infrastructure stocks expand with output growth; that infrastructure coverage and performance increase with income level; and those performance indicators also improve with income level. Telephone main lines per thousand persons, households with access to safe water, and households with electricity were used as indicators of coverage of infrastructure while the performance indicators used are diesel locomotives unavailable, unaccounted for water, paved roads not in good condition, power system losses and GNP per capital. The World Development Report cited by Aigbokhan in his Table 1 clearly shows that on all these coverage and performance indicators, middle income economies did better than low income

economies while the high growth economies did better than the middle income economies. Likewise, the OECD countries did better than the high growth economies. This shows a significant positive correlation between infrastructural coverage and performance and income level. Aigbokhan, in his own study on "Infrastructure, Private Investment and Economic Growth", adopted an extended Cobb-Douglas production function and regressed output on each of six infrastructural components, introducing each of them at a time.

These infrastructural components are transport and communications, agriculture and water resources, electricity generation, electricity consumption, education and health care. His regression results, using OLS method with annual data covering the period 1980 - 97, show that the model has a good fit with adjusted R of 0.98 - 0.99, and that the six infrastructural components are all positively correlated with GDP, with varying levels of significance. The author also found that "human capital components of infrastructure appear to have impact on growth. Expenditure on health care and education record statistically insignificant impact on growth." He avers "the fact that the variables have positive correlation is however encouraging as it suggests that if efficiently applied, public spending on the services is capable of impacting positively and strongly on growth. The least significant of the variables is agriculture and water resources. "The author concludes that "to promote investment-led growth, the type enunciated in government budget statements, there would have to be adequate funding of infrastructure both to create new capacities as well as maintain existing capacities".

Road Studies: Road Infrastructure has been found by Cesar Queiroz and Surhid Gautam to be significant factor of economic growth and development. In their 1992 World Bank study, they employed "an empirical approach to explore the association between road infrastructure and economic development. Different regression analyses were carried out using GNP/Capita as dependent variable and selected indicators of magnitude and condition of road networks as independent variable. Independent variables used in the analyses included: (i) spatial road density (i.e., road length per land area) of paved and unpaved roads classified in good, fair or poor condition; and (ii) road density or precipitate length (km/million population) of paved and unpaved roads in good, fair or poor condition".

The authors summarized their findings as follows:

Cross-section analysis of data from 98 countries, and time-series analysis of U.S. data since 1950 showed consistent and significant associations between economic development, in terms of per capita gross national product (GNP), and road infrastructure, in

terms of per capita length of paved road network. The data show that the per capita stock of road infrastructure in high-income economies is dramatically greater than in middle and low-income economies. For instance, the average density of paved roads (km/million inhabitants) varies from 170 in low-income economies to 1,660 in middle and 10,110 in high-income economies, the latter being 5,800 per cent higher than the low-income group. Road condition also seems to be associated with economic development: the average density of paved roads in good condition (km/million inhabitants) varies from 40 in low-income economies to 470 in middle and 8,550 in high-income economies".....The authors, in their conclusion, also submit that there is "a clear contrast between road infrastructure and income in low and middle-income economies in Africa: while the difference in average per capita GNP between the two country groups is 220 percent, the density of paved roads in good condition varies by about 370 per cent from one group to the other, using 1989 data. "Several authors have examined the issue of causality and it can be stated that the direction of causation between changes in income and changes in road infrastructure is not clear cut. However, Queiroz and Gautam submit that "there are some indications that roads should precede development," citing studies by Binswanger, Dhir, Lal and Mital, Shah, Hirschman, Aschauer and President George W. Bush, who asserted that "the interstate highway system fuelled development in the U.S. for a generation, uniting the states as never before-economically, politically, socially.

Port Studies: The development of seaports as an economic infrastructure assumes that like roads, communications and other economic infrastructure, ports have a positive impact on the growth and development of countries. The economic history of maritime powers such as England, Spain and Portugal clearly documents the significant and critical role which ports have played in the development of the global economy. Without ports, the Americas might not have been easily explored. Today, the United States of America is not only the leading economic global power; Uncle Sam is also a maritime, technological and political superpower. Port development has positive employment and revenue effects. Quite apart from that, the facilitation of international trade has multiplier effects on the national economy and increases supply elasticity's. Short-run and temporary domestic shortages of developmental inputs can be met through importation; thus moderating domestic inflation and stabilizing the domestic price level.

The positive balance of trade and balance of payments effects of good ports and harbours cannot be denied. The beehive of activities in seaports all

over the world clearly shows that ports have significant economic impact both locally, regionally and nationally. In fact, the leading sector of a country like Singapore is the seaport. Ports have enabled Japan to build export processing zones that have turned Japan into exporters of goods which cannot be produced on the basis of the country's factor endowment profile. Theoretically, seaports are an economic infrastructure with significant multiplier effects on the domestic economy. Some studies have tried to assess the regional development impact of ports. For an example, Olukoju has undertaken a detailed study of the politics, administration and economics of ports.

He submits that "scholars have sought to tantalize the contribution of the catchment area which could be a region within or astride national boundaries..... In general, the city-port in the LDCs not only attracts labour from the hinterland but creates disparities in the economy between the city and the rural areas, and disequilibria between islands of advancement and seas of subsistence and, above all, between population growth and economic growth.

This indicates that the regional developmental impact of ports could be both positive and negative, depending on particular situations. The examples of Tema in Ghana, Cotonou in Benin, and Lome in Togo, however, show how technological innovation has resulted in the emergence of an industrial growth pole of considerable national significance". A particular example of empirical research on the economic impact of port specific regions cited by Olukoju is the Canada Ports Corporation's development of a computerized Ports Canada Economic Impact Model which "measures the economic benefits of the freight handling activities of our ports on the local, provincial and national economies..... And provides a realistic and defensible assessment of the economic contributions of the ports.

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The following statistics were supplied: in 1987, 32,199 direct, and 23, 246 indirect, jobs were attributed to the ports while 400,000 jobs were related to firms which exported cargo through the ports. It was estimated that the personal income impact of the port system totalled \$2.7 billion of which \$0.9 billion was direct income earned. The tax impact was put at \$0.8 billion. Figures for the port of Saint John, New Brunswick were 2029 jobs (total employment impact), \$112 million (revenue impact), \$29 million (tax impact) and \$32 million (direct personal income impact)." Olukoju further notes that "some scholars are critical of port impact studies, especially those designed by port authorities to justify port investment." It is further contended that the observable economic transformation of the region is not attributable to only "one element in a large number of producing and distributing systems" in place at the ports. Also, "accurate quantification of the regional impact of ports is rendered difficult by the diffuse nature of port traffic, the origins and destinations of which often lie far beyond regional or national boundaries, and hence, beyond the range of statistical accuracy."

Conclusion: Economic and Social Infrastructure play a crucial role in the development of nations, whether developed or still developing. They provide the basic foundation on which the superstructure of development and growth can be erected. Obviously if the foundation is weak and fragile, it is doubtful that any superstructure can be built on it. Such will be a pipe dream. However, if the foundation is very strong, any structure built on it, simple or super, is likely to provide continuous and stable services for the foreseeable future. Once the economic and social infrastructural foundation is strong, development 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 sure and cumulative.

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Dr. Sangappa V. Mamanshetty/ Assistant Professor & HOD/ Dept of Economics/
Govt. First Grade College/ Chincholi/ tq: Chincholi/ Dist: Kalaburgi - 585307/ Karnatka - State/ India/