



## COMPARATIVE ANALYSIS OF INFRASTRUCTURAL FACILITIES IN INDIA AND CHINA

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### **Abstract**

*The two Asian tremendous giant India and China are the fastest growing economies. Both the countries are mostly compared with their spectacular performance in achieving economic growth and development. Most of the studies are on the basis of trade, foreign direct investments, poverty, and inequality. So because of similar characteristic regarding the population growth there are many studies on labor issues. Infrastructure is also crucial factor not only in determining the economic growth and development but it also promotes trade, FDI, reduction in poverty and inequality. As the infrastructure is the backbone of the economy the purpose of the study is to compare the various Infrastructural facilities in both the economies. The paper focus on analyzing the infrastructural facilities by making a separate index by the type of infrastructure (i.e Physical, Financial and Social infrastructure) and also a composite index which is known as INFRAINDEKX. The author highlights that there are more variations between India and china in relation to financial infrastructure index which affects the investment and flow of funds in the form of FDI and other capital inflows. The social infrastructure index has a huge impact on human capital dividends and the physical infrastructure index there are variations in relation to both the countries which affects the income and employment in both the countries.*

**Keywords:** *Infraindex, Economic growth, Foreign Direct Investment, Physical Infrastructure, Financial and Social Infrastructure.*

### **INTRODUCTION**

The two Asian countries India and China are highly competitive in economic, social and other factors. Both the countries are the emerging economies in both the growth as well as development aspects. India also shares a certain common characteristics and one of them is population growth in these two giant countries. China and India are 1<sup>st</sup> largest and the 2<sup>nd</sup> largest countries in the world, global interest in India and china, the two Asian giants, is more than mere curiosity. never before have such large economies with combined population of 2.3 billion grown so fast for so long (world bank, 2007a). The previous accounts for 19% and recent accounts for 17.5% of the world population. Till 2050 the other nine countries are expected to grow and will account for half of the world populations where India and china are amongst them. India and china relations are from the ancient times and are still continued. China has also influenced India in cultural way by spreading the Buddhism. India and China also have the border disputes which led to conflicts the China - Indian war in 1962. China and India has also improved their trade relations after 1980's. Both the countries frequently visit to each other nations a very recent visit to India by president Xi Jinping (china) with PM Modi in September 2014. The Visit has encouraged more infrastructure investment in India by Chinese governments. The infrastructure projects which might come in future in India its mainly on railway projects and various industrial parks in Gujarat and Maharashtra which will be financed by bank of China. The three important agreements that took the china and India are as follows:

1. The agreement on the co-operation of the Industrial parks.
2. The agreement signed between Guangdong province, China and government of Gujarat, India on co-operation in trade and industry, science and technology, health, environmental studies, culture and tourism, sports, waste water management and infrastructure.
3. The agreement signed between Guangzhou and Ahmedabad Municipal corporation knowledge sharing on issues like science and technology, environment, education, health and culture etc.

### **INDIA AND CHINA CHARACTERISTICS**

India became independent in 1947 and prior to that in British colonial rule. India in 1990 due to the macroeconomic crisis in 1990's strongly became liberalized economy with the democracy. The most important phase in history and a turning point for Indian economy was the deregulation of the public sector an encouraged privatization. It reduced the barriers in investment and trade with the foreign countries to accelerate the economic growth. The growth rate of India has remained around 5 percent in the pre reforms period and its increase around 7 percent during the post reform period. In first five year plan India mainly concentrated on agriculture while in the second plan it shifted to industry and manufacturing sector with the huge amount of investment as per the Mahalanobis Model. Later the Indian economy realized the growth from services sector which dominated the growth rate of India around 9 percent. China formed as People republic of China in October 1949 under leadership of Mao Zedong.

According to Pravakar Sahoo ,Ranjan Kumar Dash and Geethanjali Nataraj, "China is the fastest growing country in the world for last few decades and accounts for nearly one fifth of the world population. Economic growth in China increased

from 7.5% during 1970 to 1999 to over 10% per annum during 1999 to 2008. This has attracted many scholars to examine the major determinates of growth in China". In the 1970's China has become market oriented and moved from the centrally planned system. The economic reforms in China started in 1978 and post reform the take-off took growth of China. Later in 1990s period China changed its policy to fiscal decentralization where it enhanced the growth of major sectors in infrastructure. Fiscal decentralization, autonomy of state owned enterprise, growth of private sector, opening up for foreign trade and investment which has made china as a largest exporter in the world. Systematic changes in china has led to massive tenfold increase in their GDP in china .Both the countries have a serious problem of corruption, population explosion, labor mobility, migration and also the Infrastructure challenges which are unmet due to the bulk amount of pressure due to population growth. There are many comparative studies between these two powerful nations which have emphasis on mostly the growth and development perspective such as bilateral trade and investment, foreign direct investments, comparative costs and on labor issues. Infrastructure is one of the determinants for economic growth and also for attracting foreign inflows. There is need to analyze the infrastructure facilities which are available in both the economies. Thus the paper tries to focus on comparative analysis of infrastructural facilities in India and China.

### Selected Indicators of both Economies

Country Name	Indicator Name	1990	1995	2000	2005	2010	2013
China	GDP (constant 2005 US\$)	5485	9155	1417	2257	3839	4864
India	GDP (constant 2005 US\$)	3502	4487	6027	8342	1244	1459
China	GDP per capita (constant 2005 US\$)	483	760	1122	1731	2870	3583
India	GDP per capita (constant 2005 US\$)	403	469	578	740	1032	1165
China	Population density (people per sq. km of land area)	121	128	134	140	143	145
India	Population density (people per sq. km of land area)	292	321	351	379	405	421
China	Exports of goods and services (% of GDP)	14.7	20.23	23.33	37.07	29.4	26.4
India	Exports of goods and services (% of GDP)	6.93	10.66	12.77	19.28	21.97	24.81
China	Imports of goods and services (% of GDP)	11.97	18.58	20.91	31.55	25.64	23.84
India	Imports of goods and services (% of GDP)	8.31	11.82	13.66	22.03	26.34	28.41
China	Foreign direct investment, net inflows (% of GDP)	0.98	4.92	3.2	4.93	4.6	3.76
India	Foreign direct investment, net inflows (% of GDP)	0.07	0.58	0.75	0.87	1.6	1.5

Source: World Bank, World Development Indicators

### Infrastructure

American Heritage Dictionary Editors (2002) defines the term "infrastructure" as the basic facilities, services and installations needed for the functioning of a community or society such as transportation and communications systems, water and power lines and public institutions including schools, post offices and prisons. Infrastructure can be classified into two major types: 'Economic Infrastructure' and 'Social Infrastructure'. Economic infrastructure is defined as the infrastructure that promotes economic activity, such as Roads, Highways, Railroads, Airports, Sea Ports, Electricity, Telecommunications, Water Supply and Sanitation whereas Social infrastructure such as Schools, Libraries, Universities, Clinics, Hospitals, Courts, Museum, Parks. The World development report has also emphasized on Infrastructure. Infrastructure is crucial for increasing the productivity of the various sectors in the country. Infrastructure acts an input to various production and economic activities. It gives a stimulus to more economic activity which further enhances the employment.

According to the World development Report (1994), "Productivity growth is higher in countries with an adequate and efficient supply of infrastructure services. Provision of infrastructure services to meet the demands of business, households and other users is one of the major challenges of the economic development. The report also points out that adequate and good quality of infrastructure is a crucial factor in attracting foreign investments". The Global Competitiveness Report 2010-

2011 of the 2010 World Economic Forum uses 12 determinants i.e. “Pillars” to measure competitiveness and one of the pillar is Infrastructure. The report emphasis on the need of infrastructure for effective functioning of the economy, as it is important factor in determining the location of the economic activity. A country’s development is linked to its infrastructural facilities and its ability to expand trade, cope with population growth and reduce poverty. Infrastructure is an input to production and raises the productivity of other factors. Infrastructure connects goods to the markets, workers to the industry, professional to the services and the poorer in rural areas migrate to urban commercial business centre. Millennium Development Goals (MDG’s) of United Nations (UN) emphasized the role of infrastructure in reducing poverty has been recognized by increasing the access to water supply, health and educational services which helps in narrowing the gap between rich and poor.

### **SELECTED INFRASTRUCTURE INDICATORS FOR ANALYSIS**

Author has been selected some measures for analysis of infrastructure growth in India and China. It is classified in mainly three categories as follows:

#### **I) Physical infrastructure**

- Roads, Paved (% of Total Roads)
- Rail lines
- Air transport, registered carrier departures worldwide.
- Container port traffic
- Electric power consumption (per capita Kwh)
- Agricultural irrigated land (% of total irrigated land )
- Improved water sources, rural (% of rural population with access)
- Improved water sources, urban (% of urban population with access)
- Fixed broadband internet subscribers(per 100 people)
- Mobile cellular subscriptions(per 100 people)
- Internet users (per 100 people)

#### **II) Financial Infrastructure**

- Domestic credit provided by the financial sector (% of GDP).

#### **III) Social Infrastructure**

- Literacy rate, adult total (% of people ages 15 and above)
- Public spending on education, total (% of GDP)
- Expenditure per student, primary (% of GDP per capita)
- Health expenditure, public(% of total health expenditure)
- Out-of-pocket health expenditure (% of private expenditure on health)

The data source of these infrastructure variables is from World Bank. The analysis comprise of a decadal period from 2000 to 2010. The Physical infrastructure includes transport infrastructure, Power, agriculture infrastructure, drinking water sources and telecommunication infrastructure. Transport infrastructure further includes roads, rail, airports and ports. The roads statistics which is included in this paper are the paved roads as a percentage of the total roads in the country. Paved roads are those roads which have smooth surfaced. The rail lines are the length of railway routes in a particular country. The air transport can be measured by the number of registered departures that took worldwide. The traffic data of ports measures the flow of containers from land to water transport. Power is measured by the per capita consumption of electricity in kwh. Agriculture infrastructure can be measured through the land which is irrigated through various sources of water as a percentage of total agriculture land. Drinking water sources are further categorized in rural and urban population access which includes piped water within the premise. Telecommunication infrastructure can be measured through fixed broadband subscriber, mobile subscribers and Internet users. The financial infrastructure can be measured through the various financial institutions credit of the country. Financial infrastructure acts as a capital required for infrastructure where banks plays a crucial role in investment of a country. The social infrastructure which enhances the human capital has been realized through promoting and developing education and health infrastructure. The education sector can be promoted through government spending so can be measured by public spending on education as a percentage of GDP and expenditure per student for primary education. The literacy rate shows the literacy of the country which is a measure of development in overall country. The Health infrastructure can be measured with the total spending on health by government as well as the private sector in the country.

## D) Physical Infrastructure

### 1) Transport Infrastructure

YEARS	Roads, paved (% of total roads)		Rail lines (total route-km)		Air transport, registered carrier departures worldwide		Container port traffic (TEU: 20 foot equivalent units)	
	INDIA	CHINA	INDIA	CHINA	INDIA	CHINA	INDIA	CHINA
2000	47	22.4	62759	58656	198426	572921	2450656	41000000
2005	48.619	40.75835	63465	62200	330484	1349269	4982092	67245263
2010	53.09	60.93003	63974	66239	623196.8	2377789	9752908	130290443

Source: World Bank, World Development Indicators.

The Paved roads of India in 2000 are 47% out of the total roads where as in China it accounts only 22.4% out of the total roads. In 2005 there is tremendous increase in the number of paved roads in china with a significantly increased nearly about 18% where as India increased in hardly 1% growth of paved roads. In 2010 the growth of china in paved roads has grown to another 20%, India growth accounts nearly about 5%. It shows that there is tremendous increase in the growth of Chinese economies almost 38% growth till 2010 which indicates a huge investment on roads which further enhances the employment and income levels. In China and India rail lines showing an upward trend from 2000 to 2010. Both the countries are quite competitive in respect to rail lines but the growth of china is much faster growth post 2000 than India growth is negligible. Thus the growth of china in terms of rail line exceed the growth of India in 2010. There is nearly a gap of 3% growth in rail lines of India and China. Air transport departure worldwide from India is low than the china in all consequent periods which indicates that in India lacks air transport facility and is inefficient. Though from 2000 to 2010 it has increased but there is double time increase in china. Air transport plays a vital role in improving the trade relations globally. This also indicates that china has more and efficient amount of trade globally as with the more air transport infrastructure. Sea transport traffic in china is twice of India throughout the three consequent periods from 2000 to 2010. Both the countries shows positive trends but India lagged far behind China. This indicates that china most of trade is through sea transport. China's sea transport infrastructure is more developed than the India.

### 2) Power Infrastructure

YEARS	Electric power consumption (kWh per capita)	
	INDIA	CHINA
2000	390.9546	993.33859
2005	461.0806	1783.8708
2010	641.2717	2943.6909

Source: World Bank, World Development Indicators

The per capita consumption of electricity is higher in china as compared to India in all consecutive periods. The availability of power in china is more in china which enhances the various industrial sectors and can gives a boost in the growth of manufacturing sector. The per capita consumption OF china is almost 3 times more than that of India.

### 3) Agriculture Infrastructure

YEARS	Agricultural irrigated land (% of total agricultural land)	
	INDIA	CHINA
2000	32.2282	9.0887991
2005	32.91819	10.290463
2.0010	35.18934	10.290463

Source: World Bank, World Development Indicators

Agriculture irrigated land as a percentage of total agricultural land is much higher in India than the china. In 2000 period India accounts for 32% of irrigation which increased to 35% in 2010. In China in 2000 it only accounts 9% which increased to 10% in 2010. From the period 2000 to 2010 it irrigation hardly increased by 1%.

#### 4) Water Supply

YEARS	Improved water source, rural (% of rural population with access)		Improved water source, urban (% of urban population with access)	
	INDIA	CHINA	INDIA	CHINA
2000	76.1	70.4	92.4	97.5
2005	82.2	77.6	94.2	97.9
2010	88.3	84.9	96	98.4

Source: World Bank, World Development Indicators

Drinking water facility is one of the most important parts of infrastructure facilities. Percentage of population drinking access to improved water sources which includes piped water on within the premises and public taps. The supply of drinking water in rural area of both nations has positive trends. Both the countries have remained competitive in providing improved water sources from 2000 to 2010. The improved water sources and access to urban population shows a clear trend with the better drinking facilities in urban area than the rural area. Both the countries have clearly done well in providing the water facilities in urban area but still china is on higher scale than providing improved water facilities in urban area compared to India.

#### 5) Telecommunication Infrastructure

YEARS	Fixed broadband Internet subscribers (per 100 people)		Mobile cellular subscriptions (per 100 people)		Internet users (per 100 people)	
	INDIA	CHINA	INDIA	CHINA	INDIA	CHINA
2000	0	0.0017697	0.343205	6.658708	0.527532	1.775913
2005	0.119594	2.833459	7.997207	29.84471	2.388075	8.523257
2010	0.911561	9.2907049	62.39006	63.17028	7.5	34.3

Source: World Bank, World Development Indicators

Telecommunications in India as one of the modern infrastructure and India has already achieved a lot in the sector as by opening up for the private sector in recent times still this sector is far behind when compared with china. As the chart indicates that the fixed broad band internet subscribers connections per 100 people in India is zero in 2000 and increased to 0.12 in 2005 and in 2010 massively increased to 0.91. fixed broadband internet subscribers per 100 people in china in 2000 was 0.0001 steadily increased to 2.833 in 2005 and then increased better than India to 9.29 subscribers per 100 people.

#### Financial Infrastructure

YEARS	Domestic credit provided by financial sector (% of GDP)	
	INDIA	CHINA
2000	51.18699	119.67208
2005	58.36176	134.29795
2010	71.94498	146.27779

Source: World Bank, World Development Indicators

Financial infrastructure indicates the financial status of the economy. A good infrastructure makes country financial soundness not only internally but also for the foreign investors. Any of the investor invests in the other country by their financial position as well the infrastructure developments. Proper growth of financial sector also helps in promoting the domestic savings and mobilizing the resources to production activities through loan and advances eg. Banks. The domestic credit provided by financial sector as a percentage of GDP 51.18 in 2000 which increased to 71.94 in 2010. China's domestic credit provided by financial sector as a percentage of GDP is 119.67 to 146.27 from 2000 to 2010. The change in Indian financial sector credit is nearly about 21% whereas china's is 27%.

## Social Infrastructure

Social Infrastructure is structures or the institutions which are useful to the whole Society or Community. Social infrastructure acts as welfare good and is mostly backed by the government as an autonomous expenditure for the welfare of the state. Productivity increases with increasing the state spending also known as Wagner law by the German economist Adolph Wagner (1835-1917). The education and health are the main drivers of the economic development. The endogenous growth model suggests that investment in human capital, knowledge and innovation have a significant effect on the growth and the spill over effect in the country. Lucas model of the growth has emphasized on human capital formation. According to the human development report (2013) human development index in India is 0.586 which is in medium group of HDI value where as China accounts for 0.719 in high group of HDI value.

### 1) Education Infrastructure

YEARS	Literacy rate, adult total (% of people ages 15 and above)		Public spending on education, total (% of GDP)		Expenditure per student, primary (% of GDP per capita)	
	INDIA	CHINA	INDIA	CHINA	INDIA	CHINA
2000	61.01456	90.920212	4.25026	2.87	14.40171	6.084
2005	62.75447	NA	3.1338	1.90672	10.98533	NA
2010	NA	95.124474	3.31959	1.90672	7.19477	NA

Source: World Bank, World Development Indicators.

### NA- data not available

From the point of view to measure the education infrastructure, we have consider the literacy rate, total public spending on education as a percentage of GDP and expenditure per student on primary education as a percentage of GDP per capita. The literacy rate trends shows that it has been remained around 60 percent in India whereas China's literacy rate is much higher than the India around 91 percent in 2000 and has increased to 95% in 2010. The total public spending on education as percentage of GDP and Expenditure per student primary as percentage of GDP per capita in India is higher than China.

### 2) Health Infrastructure

YEARS	Health expenditure, public (% of total health expenditure)		Out-of-pocket health expenditure (% of private expenditure on health)	
	INDIA	CHINA	INDIA	CHINA
2000	25.97066	38.283184	91.8086	95.56473
2005	22.07085	38.766383	90.26943	85.25676
2010	28.14936	54.311002	86.00314	77.24191

Source: World Bank, World Development Indicators

India has a universal health care system which is run by various states and union territories but still India health care infrastructure remains in the bottle neck and is far less when compared to China. As both the countries are giants with regards to population there exists a gap in providing the health infrastructure efficiently. Most of the health sectors are fully backed by the government support which also lead to increase in the fiscal deficit and financial burden of the country. Henceforth there is a need for private participation in these sectors to increase the number of hospitals and various health centers to provide the health infrastructure facilities efficiently. As per the world development indicator (2012) the health expenditure by public as a percentage of GDP in China is 3 percent and India hardly spends only 1.3 percent of the GDP. The health expenditure by the public sector indicates as a percentage of total health expenditure has increased over the decade in both the countries but the increase in china expenditure on health by public is 16 percent India increase over the decade is only 3 percent. The private expenditure has continuously reduced over the periods in both the countries. One of the reason of reduced expenditure in the health sector may that other sectors like in most of the physical infrastructure the rate of returns are much higher when compared to social sectors. There is a need to increase the participation rate of private sectors in health sectors by providing incentives and liberalizing the policy towards the encouragement of private sectors.



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