

Infrastructure Economics
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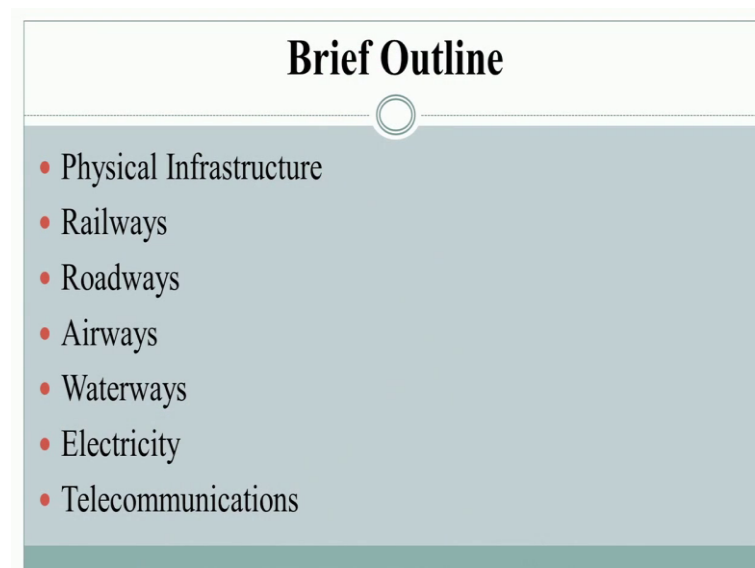
Module – 07

Lecture - 28

The Physical Infrastructure Growth in India (1950-1991)

Let me begin with the Physical Infrastructure in India especially after independence, in this presentation I will discuss the infrastructure development, economic infrastructure development after 1915 and to, which has continued till 1990. Because, we are finding that 91 was the year of economic reforms in India, majority of the economic reforms are started in 1991. So, we will have a separate discussion on the post economic reforms infrastructure growth in India, for pride to that I would like to draw your attention on how the post independent India has continued its growth in infrastructure field.

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Before discussing in detail at the sectoral level, I will try to explain what is basically the important of physical infrastructure; it is true that we have discussed enough about the role of infrastructure in economic growth. But, let me again recap before discussing the different areas of infrastructure in India.

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Importance of Physical Infrastructure : A Recap

- Physical infrastructure is directly concerned with needs of such production sectors like power, transport, telecommunications etc.
- Physical infrastructure is an integral part of development which provides basic services that people need in daily life

As we are aware that physical infrastructure is directly concerned with needs of such production sectors like power, transport, telecommunication and this type of infrastructure is an integral part of development, because it provides the basic services to the people and it really fulfills the need of the daily life of the people. So, it is indeed important that what type of physical infrastructure is going to develop in any country in any economy.

And if you can just see here that these facilities has the forward and backward linkage, if an economic is adding certain infrastructure. We have theoretically proved, we have seen theoretically that how production possibility curve shift if you will again remember one of my introductory lecture, you will find out that these infrastructure are helping the economy to move, to shift from the previous production possibility curve to the right production possibility curve. And this moment, this shift is not possible without having the infrastructures facility developed in any economy.

At the same time, if the facilities of infrastructure is deteriorating, if the existing roads are not properly maintained, if the existing flyovers not properly maintained in the economy, if the railway tracks are not being maintained, if the ports and airports are not really well taken care, then it has the backward impact on the economic growth process.

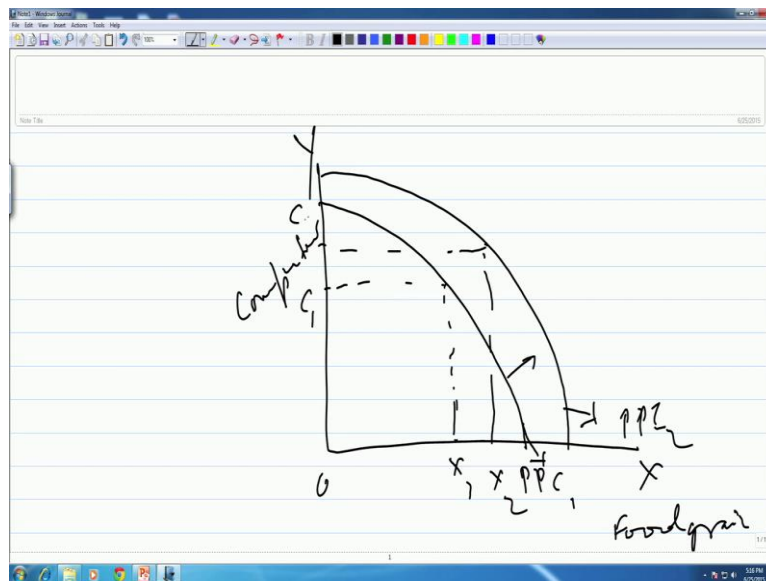
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Physical Infrastructure...

- Physical infrastructure facilitates growth through forward and backward linkages.
- It improves competitiveness, supports productive sectors, generates high productivity and leads to economic growth in a country.
- The total investment in infrastructure which includes roads, railways, ports, airports, electricity, telecommunications, oil gas pipelines and irrigation is estimated to have increased

And then, this production possibility curve which we can see it here...

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It cannot be really move from, it cannot really shift from the previous level to the new level. So, here we can see this is the first PPC, this is the second production possibility curve and the second production possibility curve shows that, how the new level of infrastructure has moved the countries possibility. Suppose production possibility curve is the curve, which shows the countries production possibility between two goods or in

suppose, on O X axis we have the possibility of traditional food grain, food item or food grain.

And on OY axis, we have the production possibility of computer; we can see here that if the economy is shifting from PC1 to the PC2 level which means that economy is in the position to produce more output. So, if you can just connect this line, this is the X 1 production of food grain and C 1 production of computer and if the country is really moving from this curve, from PPC 1 to PPC 2 any point on this particular curve is showing us that there is really more production of food grain X 2 and more production of computer.

This has not happened without having proper adjustment in the, proper growth of the physical infrastructure in the economy. So, let us come back to the discussion which we are having that physical infrastructure is really helpful in the production of, in the further production of economy. Because, it really improves the competitiveness, supports the productive sectors, generates high productivity and leads to economic growth in a country.

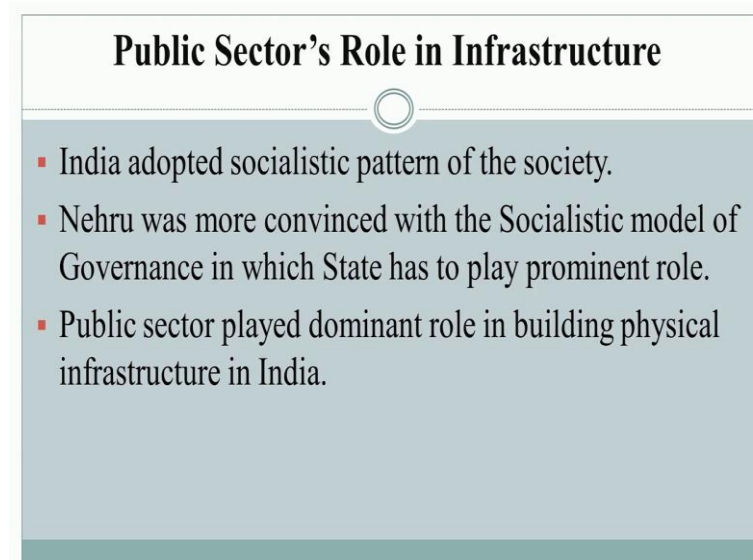
The total investment in infrastructure which includes roads, railway, ports, airports, electricity, telecommunication, oil and gas pipelines and irrigation is estimated to have increased return. Because, whatever expenditure a country is having, really those investment, those expenditure on these items are really giving us more increased way of return, so that this physical infrastructure growth is really important for any country.

Given this background, let me start the discussion on what was really the contribution of government in the development of infrastructure. Because, after independence in 1950-51, we thought that, India thought that there is a need to have the infrastructure development, but the entire development process was having a different set of policy argument and that was basically the socialistic pattern of the society. The prime minister, then prime minister Pandit Jawaharlal Nehru was more convinced with the socialistic model of governments in which the state has to play a very prominent role.

So, entire production mechanism was basically, completely dependent on the role of the public expenditure and public sector really played a very dominant and very dynamic role in building physical infrastructure in India in the beginning of the planning in India or we can say, the entire planning period starting from 1951 to till the end of the planning

commission, we are finding that it was really concerned about the public expenditure for the infrastructure development.

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Public Sector's Role in Infrastructure

- India adopted socialistic pattern of the society.
- Nehru was more convinced with the Socialistic model of Governance in which State has to play prominent role.
- Public sector played dominant role in building physical infrastructure in India.

Apart from the recent moment, where we were started looking for the public private partnership and the private entry in the infrastructure development. But, for till 1990 India was one of the economy in the world, which were more dependent on the public expenditure for infrastructure development.

Because, private parties within the country and private parties outside the country were not allowed to really have such development, I mean to have such participation in the infrastructure development. Governments were really having different restriction on the private entry in the infrastructure projects and that way, we found that India's infrastructure development from 1950 to 1990 was basically the matter of public expenditure and really the government control.

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Government's Role and its Impact on Infrastructure

- India had a long inning of public sector involvement in Infrastructure development.
- The restrictions on the entry of private investment has badly affected the overall growth of economic and social infrastructure.
- Physical infrastructure faced problem of delivery and efficiency after independence.
- Partition of the country further derailed infrastructure development process.

So, if we can again see the role of the government in and its impact in the infrastructure, India had a very long inning of public sector involvement in infrastructure development. And the restriction on the entry of private investment was really affecting the overall growth of the economic and social infrastructure. So, the physical infrastructure started facing the problem of delivery and efficiency after independence.

It was through that public expenditure was continued in Indian railway, public expenditure was continued in airways, in ports, in roads, but at the same time it was just because the huge investment of the public sector and there were so many political interference in such investment, in such expenditures. The fact was that, India was not really having different resources to allow such expenditures, somehow we were dependent on the assistance from the international agencies and the loan from the international agencies for the further development of infrastructure.

And governments were taking loan from the different agencies for such development and it would have been an opportunity to allow the private parties within the country and outside the country to become the partner in infrastructure growth, which is happening today. But, it was not happen during 1950 to 1990, which was one of the golden era for developing such infrastructure and we have seen that, even the partition of the country has really derailed the infrastructure development process soon after the independence.

So, if one can see just the background of infrastructure in India, India had a very basic infrastructure development during the colonial period.

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The Background of Infrastructure in India

- India had a basic infrastructure development during the colonial period. Basic infrastructure such as Railways, ports, water transport, post and telegraph services were developed.
- The famed railway network, needed up gradation, expansion and public orientation.
- The Indian road network was only million km in 1951 .

But, the basic infrastructure such as railways, ports, water, transport, post and telegram services were really developed not by the government after post independence, but by the British's before the post independence. And the famed railway network, needed up gradation, expansion and the public orientation, the Indian road network was only a very small million kilo meter in 1950-1951, which has to be extended, which was supposed to be extended and the government tried to really develop the road networks. Here, in this statistics we can see here the post partition division of the railway infrastructure, in terms of locomotive we had the 7248 passenger coaches.

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Post-Partition Statistics of the Division of Railway Infrastructure				
Country	Locomotives	Passenger coaches	Goods wagons	Kilometres
India	7,248	20,166	2,10,099	54,376
Pakistan	1,339	4,280	40,221	11,133

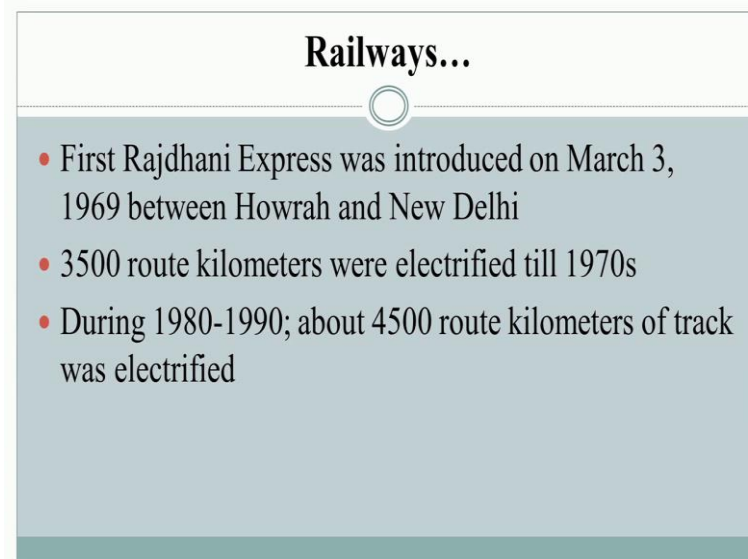
We had 20,166 coaches, goods wagons were 2 lakh 10,099, where the kilo meters railway lines were 54,376. If after the partition, we have to also divide the Indian railway infrastructure with Pakistan and then, the locomotives in Pakistan at that time was 1,339, passengers coaches 4,280, goods wagons 40,221 and the rail line kilometers were 11,133. So, this shows the country which had the more bigger size of the rail line, more big number of locomotives, large number of passenger coaches has again the distribution or division of the railway infrastructure that was really set were for India, Indian railway after the partition.

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Railways
<ul style="list-style-type: none">• Indian Railways were integrated after the independence and brought under the Railway Board for better management• Chittaranjan Locomotive Works was established in 1949 to produce steam locomotives and an agreement was signed with Swiss Car and Elevator Co. of Schlieren-Zurich (Switzerland)• Integral Coach Factory (ICF) in Perambur was established in Madras in 1953.• Rapid pace of electrification was underwent during 1960-69

After independence, we find out that Indian railway were reintegrated and brought under the railway board for better management. Chittaranjan locomotive works was established in 1949 to produce a steam locomotives and an agreement was signed with Swiss Car and Elevator Company of the Switzerland. Integral Coach Factory in Perambur was established in Madras in 1953 and the rapid pace of the electrification was underwent during 1960 to 69.

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Railways...

- First Rajdhani Express was introduced on March 3, 1969 between Howrah and New Delhi
- 3500 route kilometers were electrified till 1970s
- During 1980-1990; about 4500 route kilometers of track was electrified

First Rajasthani express was introduced on March 3rd 1969 between Howrah and New Delhi and 3500 route kilometers were electrified till 1970's. During 1980 to 1990, about 4500 route kilometers of track was also electrified. So, this shows that even after independence due to the public expenditure, we had reached to the new heights in terms of railway networks and railway infrastructure.

And this development cannot be ignored as a part of the development in the post independence India in terms of adding the kilo meters, adding the number of trains, adding the other facilities such as having the integrated coach factory and locomotives works. We can see here that not only the railway, but also we have seen the progress of road networks.

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Progress of Road Network					
Roads	1950-51	1960-61	1970-71	1980-81	1990-91
National Highways	22	24	24	32	34
State Highways	45	62	70	95	127
Other Roads	333	429	821	1358	2166
Total	400	515	915	1485	2327

Source: Infrastructure Development Finance Company (2007)
All figures in thousand kms

In terms of national highway which was in 1950-51, only 22 it has grown to 24, in 60-61 and by 1990-91 we have 34 national highways. At the same time, we had state highways which was in 1950-51 only 45, within 10 years the state highways has increased from 45 to 62. Again in 1970-71 the state highway has increased from the previous level of 62 to 70, by 1980-81 the state high way has increased from the previous level of 70 to 95, by 1990-1991 we found that it was 127 state highways.

In terms of other roads, we are having 333 other roads available by 1950-51, with some addition it as going to the level of 429 in 1960-61, by 1970-71 it reach to the level of 821, again by 80-81 1352 other roads were added and by 90-91 we found that 2166 other roads were added. So, in terms of national highways, we have increased in terms of a state high way we have increased 3 4, in terms of other roads also we have increased by 6 to 74 and this shows that in the post independence era in terms of road network, India have new heights to achieve.

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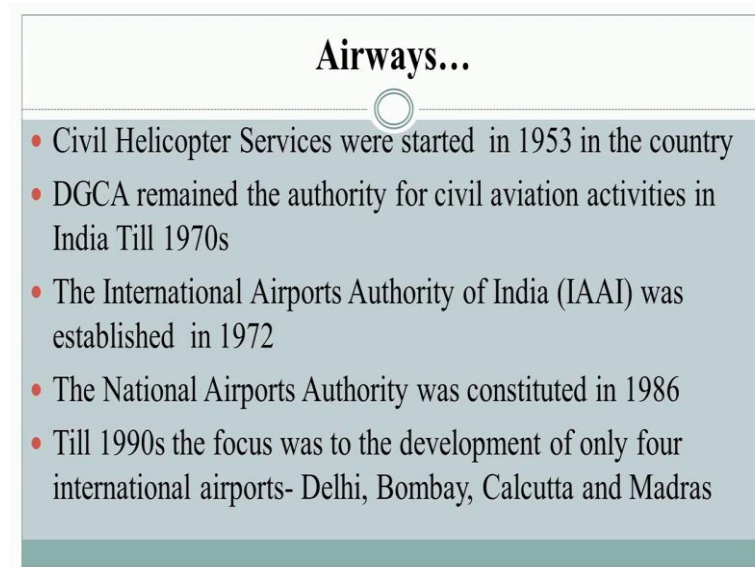
Airways

- After the independence, civil aviation was in war-torn condition which lacks basic infrastructure
- Runways were fit for only small/medium size aircrafts
- Eight Air Transport Companies were operational in India at the time of Independence. These include Tata Airlines, Indian National Airways, Air Service of India, Deccan Airways, Ambica Airways, Bharat Airways and Mistry Airways
- An Agreement was signed by Air India with the Government for the operation of international services under the name Air India International Ltd in 1948

In case of airways, if you will see the airways infrastructure development after the independence, civil aviation was in war-torn condition with lacks of basic infrastructure facilities. Runways were fit for only small medium size aircrafts; Eight Air Transport companies were operational in India at the time of independence. These includes Tata air lines, Indian national airways, air service of India, Deccan airways, American airways, Bharat airways and Mistry airways.

An agreement was signed by Air India with the government for the operation of international service under the name Air India International Limited in 1948. So, soon after the independence we found that there was some moment to have the international service in the name of Air India, which was well supported by the government of India.

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Airways...

- Civil Helicopter Services were started in 1953 in the country
- DGCA remained the authority for civil aviation activities in India Till 1970s
- The International Airports Authority of India (IAAI) was established in 1972
- The National Airports Authority was constituted in 1986
- Till 1990s the focus was to the development of only four international airports- Delhi, Bombay, Calcutta and Madras

So, Civil Helicopter Services were started in 1953 in the country DGCA, remained the authority for civil aviation activities in India till 1970s. So, the International Airport Authority of India (IAAI) was established in 1972, as one of the authority to take care of the activity related to the airways. The national airport authority was constituted in 1986 and till 1990 the focus was to developed tom was to develop only four international airport Delhi, Mumbai, Bombay, Kolkata and Madras.

Because, there four cities were also the developed previously in terms of infrastructure by the Britisher's and having the background of pervious development even after post development we found that all these cities continued to get infrastructure growth even by the public support public expenditure. And since the Delhi was the capital the political capital, Mumbai was the financial capital, Kolkata was the business capital, and madras was well connected with the other three cities and also having the sea route these cities, were also developed properly for in case of in terms of airways infrastructure. If you see the water ways infrastructure developed after post independence.

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Waterways

- There were major 5 ports in India in 1951
- Aggregate traffic increased moderately during the first 25 years after independence, from 20 million tonnes in 1950 to 67 million tonnes in 1975
- Crude oil and iron ore are the main commodities handled by the ports
- Indian shipping have 59 vessels in 1947, increased to 65 in 1982
- Cargo increased from 14 million tons in 1973-74 to 28 million tons in 1979-80

There were major five ports in India on 1951, which has aggregate traffic increase moderately during the first 25 years after independent from 20 million tones in 1950 to 67 million tones in 1975. So, it was the moderate increase in the traffic especially in the water ways crude oil a iron ore are the main commodities angled by the ports Indian shipping had 59 vassals in 1947, which was increase to 65 in 1982 cargo increase from 14 million terms in 1973-74, 224,1979 and 80. So, in case of water ways also we found that there was a moderate infrastructure developed after the post in dependence and again credit goes to the expenditure made by the government.

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Growth of Electricity Sector

Year/Period	Installed capacity (MW)	No. of Villages Electrified	Length of T & D lines(Ckt. Kms)	Per capita consumption (kWh)
1947	1362	NA	23238	16.3
1950	1713	3061	29271	18.2
1956	2886	7294	85427	30.9
1961	4653	21754	157887	45.9
1966	9027	45158	541704	73.9
1969	12957	73739	886301	97.9

In terms of electrification or electricity growth we can see here, that in 1947 the installed capacity in India was 1362 mega watt, number of village electrified by 1950 is soon around 3061, village length of T and D lines, were 29279 and per capital electricity consumption, which was at time of independent 16.3 as increased by more points around 18.2. In 1956 we found that the installed capacity of mega watt has increased from the previous level of 1713 mega watt in 1950 to 2886 mega watt in 1956.

The number of villages electrified in a 1956 was much improved from 1950 level, but again it was really very small size in terms of having the number of villages in India at that time. But, still 7294 villages is showing that is soon after independence and soon after the first five year plan, India achieved just two times increase in terms of the number of village electrification. In terms of length of T and D line we also found that after the first at the time of first 5 year plan completion India had tremendous increase in terms of T and D lines, which has increased in, increased from 29279 to 85427.

In terms of per capital consumption also as a result of the development in electrification we had 30.9 kilo watt per capital consumption kWh consumption after 1956. Compare to 1956 if one can see the 1961 data in terms of per capital power consumption we again reached to the new height and that was 45.9 kWh compared to 1947 these increases is around three times compare to 1947 and this happened only in 13 years time. In terms of number of village electrified in 1961 it crossed 21754 and this shows that compared to 1956 India had more village electrification on a very fast as speed and it is around three times higher than the previous level of 1956.

If we see the electrification and the per capital consumption in 1966 compared to 1961. We again found that instant in terms of installed capacity half mega watt in 1961 around 90 thousand 9 thousand 27mege watt capacity was installed while the number of villages electrified was 45 thousand watt 158. So, compare to the previous data previous statistics on 1969 of the village electrification we have much advanced growth rate of 45158 and it has impacted the per capita consumption of the electricity, which has increased for the previous level of 45.9 in 1961 to 73.9,1966.

If you can see the 1969 at in terms of installed capacity, which is 12957 much ((Refer Time: 24:12)) from the 1966 data of 90 of 9027 and number of the village electricity in 1969 is also 73739, which has much bigger number then the 45158 in 1966. In terms of

per capital consumption also we can found here that in terms of per capital consumption the statistics has increased from 73.9 kWh in 1966 to 97.9 kWh, almost around 98 kWh in 1969.

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Growth of Electricity...				
Year/Period	Installed capacity (MW)	No. of Villages Electrified	Length of T & D lines(Ckt. Kms)	Per capita consumption (kWh)
1974	16664	156729	1546097	126.2
1979	26680	232770	2145919	171.6
1980	28448	249799	2351609	172.4
1985	42585	370332	3211956	228.7
1990	63636	470838	4407501	329.2

Source: Central Electricity Authority, Ministry of Power, Govt. of India (2013)

So, this progress has continued and if we can see that again installed capacity of electricity in 1974 that has 16664 and in terms of per capita consumption 126.2, which is far better number, then 98 kWh. In terms of village electrification also around 1 lakh 56,729 villages, were electrified and this source the progress in the 1974 compared to 1974 in 1979 the number of village electrification has again increased from 1 lakh 56,729 to 2 lakh 32,770 and the per capita consumption has also gone up from 126.2 level 171.6 kWh level.

By 1980 we found that the number of village electrified 2 lakh 49,799 and in terms of the per capital consumption it as gone to 172.4 within the year because we are comparing here from 1979 to 1980 we are not finding much impact in terms of per capital consumption increase in a per capital consumption and the number of village electrified. But, in 1985 the statistics of per capital consumption as much better result it has increased from the previous level of 172 to 222.7 kWh that is much advance level of progress in per capital consumption.

And at the same time we have 3 lakh 7370, 32 village electrified in 1985 by 1990 we found here that installed capacity in terms of mega watt has increased 63 thousand 36,

which is much data from, what it 320585 mega watt and in terms of number of mega watt was electrified we are having 4 lakh 7838 village electrified and the per capital consumption has increase from previous level of 228 kWh 329 kWh. So, these statistics, show us that from the initial level of 3061 villages were electrified in 1950. Now, we have new statistics and much better statistics.

Of village electrification and that is 4 lakh 2838 and in terms of per capital consumption we have sixteen point three kWh condition of the per capital consumption of 1990 which has gone up to 329 kWh per capital consumption. These statistics cannot be really ignored while we were started from the condition of having the 1362 mega watt and the per capital consumption of 16.3 kWh in 1947, that shows that what type of electrification and what type of electricity infrastructure India had at the time of independence and what contribution ((Refer Time: 28:50)) Britishers had made for electrification of India.

So, certainly in the years between 1950 to 1990 there is a much better development in electrification. But, it is a fact that, that electrification is not really giving us a better result in terms of comparing the consumption of per capita, consumption of electricity at the global level with the developed country or with the newly industrialized countries. So, to reach to that level, India needs more speedy ((Refer Time: 29:32)) electrification, more installed capacity of the power production, electricity production.

And it happened, all credit goes to the public expenditure in infrastructure sector, not a single sector was really dependent fully on the product sector and basically in the entire journey private sector investment were basically not really supported by the government. Government has not really allowed the private sector to join varieties of sector which we have discussed as a part of infrastructure physical infrastructure development after nineteen fifty in case of telecommunication.

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Telecommunications

- Investment as the percentage of planned expenditure in the telecom sector during six Five Year Plans remained low between 1.4 % and 2.7%
- It, however, increased to 3.6% in the Seventh Five Year Plan (1985-90).
- Telecommunication growth was again the matter of public expenditure for more than 5 decades. This has turned India with a low tele-density in the world.

We can see here that investment in presentation of planned expenditure in the telecom sector during six five year plan remained low between 1.4 and 2.7 percent it however increased to 3.6 percent in the seven five year plan between 1985-90. So, this telecommunication growth was again the matter of public expenditure for more than five decades this has turned India with the very low Tele-density in the world.

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Tele-Density in India

Year	Tele-density (%)	Total no. of telephone connections (million)
March 1948	0.02	0.08
March 1951	0.03	0.10
March 1961	0.08	0.33
March 1971	0.18	0.98
March 1981	0.31	2.15
March 1991	0.60	28.53

One can see here the Tele-density in march 1948, which was 0.02 percent and total number of telephones connection was 0.08 million which has increased by 1991 to 0.60

percent and tele-density in the total number of telephone connections is also 28.53 million that again shows us a very low level of Tele-density in India and very low level of tele-density in India compared to other country of the world other developed in developing country of the world.

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To Sum Up

- The condition of infrastructure remained in bad shape in India after the independence
- One of the prime reasons behind the backward infrastructure development was the involvement of public sector
- There is thus the need of private investments in infrastructure development

To come up the condition of infrastructure remained in bad shape in India after the independence. Especially in case of telecommunication, we found that even in the electrification rural electrification per capital consumption, whatever growth we are seeing that growth in compared to the other world economic that growth is really very less. One of the prime reason behind the backward infrastructure development was the involvement of the public sector and not allowing the private parties to enter in infrastructure projects.

So, there is the need of private investment ad infrastructure development, which was felt by 1990-91 it will not be the possible outcome for the government to really develop the infrastructure as for the need and the requirement of the general public. But, the previous developments, show us that India would have been a better economy if it would have been allowed the private investment to join, but it may have been a proper investment through the regulatory board or regulatory mechanism which opportunity has really made India little backward in terms of infrastructure development. May be after discussing the growth of social infrastructure in 1950-90, we will again try to see that

what happened in infrastructure growth after 1991, after the economic reform process in our next few lectures.

Thank you.