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# Altyapının gelişmekte olan ekonomilerdeki ekonomik büyümeye etkisi

**Zubair Arif Shah**

**Yüksek Lisans Tezi**

**İstanbul – 2020**

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# Abstract

This research delineates a relationship between infrastructure improvement and economic growth. In developing countries, economic growth is an essential goal and to gauge this relationship, therefore, is an essential area of research. In this paper, a general trend of this relationship is extrapolated particularly in the context of the developing countries. As a case study, the economy of Kashmir is also studied. The data set from the years 2000-2017 is taken. Various infrastructure variables like roads, transport, electricity generation, medical institutions, and others are used as inputs. Gross Domestic Product (GDP) is used as a growth factor. The correlation is established through the correlation matrix and subsequently, a regression analysis is carried out. Further based on the results some policy implications for the Kashmir economy are made. This paper also establishes the need for region-based studies and as a result, implementation programs that would make sense in region-based situations. For that purpose, the study develops a policy implication framework based on which the empirical results can be applied in practical country and region-based situations. As an example, the empirical results from the Kashmir economy is also filtered through the policy implication framework. The study hypothesizes that there is a positive impact of infrastructure on economic growth in Kashmir.

**Key Words:** Growth, Hard infrastructure, Soft infrastructure, Investment, Externalities, Regression, Correlation, Developing Countries, Gross Domestic Product, Infrastructure development, Policy implications.

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# Introduction

Infrastructure has generally become accepted in the literature as an indispensable source of economic growth. At a conceptual level, the proposition has been deemed intuitive. Better physical infrastructure would naturally lead to better connectivity, better safety, better health, and ease of living which would increase efficiency and therefore lead to more productivity. At an empirical level, the research had a seminal push with the work of Aschauer (1989)[1], who formulated an empirical framework for the same. Since then, an immense number of studies have been carried out that study the relationship between Infrastructure and Economic Growth. The research has been carried out on countries ranging from both developed and developing countries. The results by and large show a positive relationship between physical infrastructure and growth. They reiterate the theoretical premise about how infrastructure can positively contribute to economic growth. Enhancement in roads and transport infrastructure can lead to ease of trade, ease of flow in both the goods and services. Other public works such as communications, energy, water supply, and others can also have positive impacts on the efficiency of the economy. In fact, Aschauer[2] draws a table to represent how various physical infrastructures contribute to the quality of life and economic efficiency. In the Table, it can be seen how the impact of Infrastructure is shown at various levels of human habitat. Better highways can lead to reduced accidents, better air quality, and increased access to recreation. The economic opportunity being that the people can have greater access to suburban jobs, therefore, increasing employment. Also, people won't be spending a lot of time in traffic jams, which would imply they can have more leisure time that can make them more efficient at work. Similar relationships can also be seen elucidated in the table about the other areas of physical infrastructures. An increase in the number of hospitals results in higher access to health facilities and also at the same time an increase in employment. The people who will work in the hospital as Doctors, Nurses, clerks, cleaners, guards, technicians, and others would all find a new opportunity for employment. The people who get easy access to the health facilities can also subsequently perform better in their working contribution to the economy.

[1] Aschauer, D.A (1989). Is Public Expenditure Productive? *Journel of Monetary Economics (23).*

[2] Aschauer, D.A (1990). Why is Infrastructure Important? Conference proceedings, Conference series no. 34, Federal Reserve Bank of Boston, pages 21-68.

**Table 1**

| Attributes of human habitat | | | | | | |
|---|---|---|---|---|---|---|
| Infrastructure Investment | Health | Safety | Recreation | Aesthetics | Economic Opportunity | Leisure |
| <u>Transportation</u> | | | | | | |
| Highways | Increased air quality | Reduced accidents | Increased access | | Increased employment<br>Increased access | Increased discretionary time |
| Mass Transit | Increased air quality | Reduced accidents | Increased access | | Increased employment<br>Increased access | Increased discretionary time |
| Airport | | Reduced accidents | Increased access | | Increased employment | Increased discretionary time |
| <u>Waste Management</u> | | | | | | |
| Municipal waste facilities | Reduced viral infection, etc. | | | Reduced odors, litter, and turbidity | Increased Employment | |
| Solid waste facilities | Reduced toxicity | | | Reduced odor | Increased employment | |
| <u>Law Enforcement</u> | | | | | | |
| Police Stations, courts, prisons | Reduced drug use | Reduced crime | | | Increased employment | |
| <u>Fire Stations</u> | | Reduced Risk | | | | |
| <u>Hospitals</u> | Increased access | | | | Increased employment | |

The relationship as depicted in the table might not work in the binary fashion as represented. There are a plethora of other factors that need to be considered while making an investment decision on any kind of infrastructure. Aschauer himself agrees to the reality that there are negative factors that might come along with the infrastructure investments, and those negative factors need to be properly dealt with, to realize the benefits as they are represented in the table. For example, the construction of a highway might lead to the displacement of the people living in the surrounding. The government needs to properly consider all of these factors, otherwise, it would not be for the benefit of the economy or the people. Some investments might increase employment in one sector while reducing it in the other. Therefore, checking for the negative externalities is important while claiming a positive impact of the infrastructural investment. World Development Report (1994)[3] gave a practical example of how a lack of infrastructure investment can have an adverse impact on the economy. There was a very low level of investment in transport infrastructure in China. Considering that China already had one of the thinnest road networks in the world, it let to paramount bottlenecks in the Chinese economy. After the 1979 open-door policy in China, the pressure on traffic increased manifold, but there was no complimentary investment in the road or transport sector. As a result, important raw materials like coal which was used by China by 1994 to produce about 74% of energy was greatly hampered. It subsequently impacted the production of electricity as 76% of electricity was generated with the help of thermal plants. By 1989, as the study mentions, China experienced a 20% electricity deficit for the industrial requirements.[4] It's a coherent example of how inadequate investment might create bottlenecks in the economy, and also hamper the normal processing in the economy.

On the contrary, some works look at the notion of infrastructure investments critically. Some of the very pertinent points concern the question of poverty alleviation and equity.[5] Infrastructure investments do not deal with those problems directly in any established way. It might be argued in its favor through 'a rising tide lifts all boats' argument, but that assumption is hardly ever proven. The other critical points surrounding the topic are usually concerned with its implementation or

[3] World Bank (1994). Infrastructure for Development. *World Development Report 1994.* Published for Washington D.C. World Bank by Oxford University Press, New York.
[4] Ibid., pg 18.
[5] William Ashcer and Corinne Krupp (2010). Physical Infrastructure Development: Balancing the Growth, Equity, and Environmental Imperitives. Pacific Basin research Center, Soka University of America.

lack of considering the linked negative impacts. These points are valid, and therefore, point towards the need for country-based, or region-based studies to study the relationship and come up with policy implications considering the individual situations and needs of a particular economy of a country or region. The 'growth maximizing level' of infrastructure is an important insight that manifests how some infrastructures might have already reached the level beyond which they cannot further contribute to growth. Similarly, there can be undersupplied infrastructures that still hold the potential of positively contributing to the growth levels.[6] The need for an individual region-based study is evident. Before a policy decision is made, an inquiry about how the decision would relate to the political, social, and economic realities of that particular place needs to be studied. Different kinds of infrastructures may be significant in different economies, and their externalities can also be diverse. A physical infrastructural investment might not make sense in a country where poverty is a very rampant phenomenon and deserves a much higher ratio of investments in the processes that could directly deal with that problem. In a country with very advanced physical infrastructure and deep inequalities, further investments in physical infrastructure might not make sense. Huge investments on roads might make more sense in landlocked countries, whereas it might not make as much economic sense in a place surrounded by sea. It will make little sense for a country going through health crises to invest in building dams, or on electricity, or a range of other physical infrastructures. It will be useful to think of infrastructural investments also under a clinical economics framework.[7] It follows from it that even though it's generally given that infrastructure has a positive impact on economic growth, each country or region before formulating a policy must carry out similar research for that particular region, and consider all other range of factors before implementing a decision.

**Objectives**

This study will construct a framework for policy implementation of the empirical results. As it is evident that significant positive results at an empirical level are not enough for a policy decision, it needs to go through a holistic inquiry considering the political, social, and economic realities of the particular region before translation to an implementation. Who gets to bear the burden, and who

[6] Canning, David and Pedroni, Peterv (2004). *The Effect of Infrastructure on Long Run Economic Growth*
[7] Jeffrey D. Sachs (2005). *The End of Poverty: Economic Possibilities for our Time.*

benefits is also an important question.[8] The relationship between infrastructure and economic growth in developing countries is a more urgent problem. There can be immense potentialities that can be realized through such a relationship. This study takes up a case study of the region of Kashmir and arrives at certain empirical results through whatever data is available. The data is then scrutinized through the policy implementation framework constructed. Some policy implications in the Kashmir economy are discussed based on the results. There are two basic objectives of the study. The first is based on the hypothesis of this study that the infrastructure has a positive impact on growth in developing countries and particularly in the economy of Kashmir. The second objective is to construct a basic framework for policy implication decisions.

**Structure**

This section will be followed by a literature review. Some of the important and insightful academic literature on this topic is spelled out. The research works include both empirical and descriptive works. The method, variables, models, and results achieved by the empirical studies are elucidated. Similarly, the insights from the descriptive studies are also discussed in the section. It's followed by the section that discusses the definitional issues of the subject. Various facets within the realm of infrastructure such as hard and soft infrastructures are discussed. It is followed by a discussion on the studies that work on the relationship between infrastructure and economic well-being in developing countries. After a general overview of the infrastructure in developing countries, a particular focus will be undertaken on the economy of India. The current status of infrastructure in India is skimmed and also some empirical studies in the context of India are analyzed. The next section makes an empirical investigation of the region of Kashmir. The data on mostly the physical infrastructure is taken and its impact on economic growth is investigated. The policy implications based on the empirical results are discussed. It is followed by the construction of a framework for policy implication. The results from the empirical investigation on Kashmir are applied to this framework and some policy recommendations are made and reiterated. It is followed by some final concluding remarks.

[8] William Ashcer and Corinne Krupp (2010). Physical Infrastructure Development: Balancing the Growth, Equity, and Environmental Imperitives. Pacific Basin research Center, Soka University of America.

**Theoretical approach**

The theoretical approach of this thesis is based on the clinical economics approach. The clinical approach envisions economics as a medical inquiry. An economic problem is like a disease in a patient and the economist is like a doctor who approaches the problem and tries to remedy it. An essential takeaway from this relationship is that the doctor studies each patient and each problem individually and tries to arrive at a treatment. Treatment for a similar kind of disease that could work on one patient might make it worse for the other. The causes, the other existing health issues, and a range of different factors need to be considered for an effective treatment plan. There have been many examples of such failures of the imposition of policies without regard to the specific conditions. Jeffry Sachs provides some examples such as the Bolivian crises in 1990 when the US asked to remove the peasants' coca crops. Similarly, this paper adopts a similar pattern of approach where we focus on the individual condition of the region we wish to apply the policy recommendations upon. He comes up with the following five lessons from the clinical medicine that could be useful to consider for economics:

1) The human body is a complex system. (Economies are complex systems)
2) Complexity requires a differential diagnoses
3) All medicine is family medicine. (Are parents themselves capable of providing a given treatment for a child?)
4) Monitoring and evaluation are essential, and
5) Medicine is a profession. (Economics should be thought of as a profession, carefully carved, codes of conduct, specialists, etc)

Jeffery Sachs in the context of poverty provides the following checklist for the differential diagnoses.

a) Poverty Trap
b) Economic policy framework
c) Fiscal framework and fiscal trap
d) Physical geography
e) Governance patterns and failures
f) Cultural barriers, and

g) geopolitics

To arrive at a treatment for a particular economy we have to go through this differential diagnosis. He explained the details of the factors given above in his book.

It will be helpful to conceptualize various growth theories as well at a basic level before we study the relationship of infrastructure with growth.

Some of the modern growth theories have focused on savings. These include **Rostow** who focused on the stage-wise development of an economy in which savings played an important role. The stages of Rostow included the development of a society from traditional to a more capitalistic society based on consumption. Savings in his estimation was an essential precursor for a *take-off* in the economy towards the modern development. The **Harrod and Domar** growth theory also shares a similar notion of savings being an essential factor for growth to take place in an economy. The problem with such theories was that they had a limited set of vision towards what can contribute towards growth. Savings are necessary but might not be sufficient in themselves.

The **Lewis Model** focused on the transfer of labor to the industrial sector from the traditional agricultural sector of the economy. It was argued that more capital can be accumulated by working in the industrial sector which could than lead to higher levels of economic growth. It argued for more industrialization. The model, however, did not consider the problems of urbanization that follows industrialization and also possibilities of capital flight and loss of labor following the accumulation of capital.

The growth theories of **Clark-Fisher** also call for a structural change towards the service economies. It is the idea of the development of an economy from primary to secondary to the tertiary sectors.

**Dependency theory** focused on the inbuilt relationship of domination and exploitation in the modern capitalistic system. According to the dependency theory, the cycle of the current system will maintain the position of rich countries and a specific class within them. Therefore, to achieve better growth and development for individual countries (developing), they need to focus on internal development. They are known for the inward-looking approach.

**New Classical theory** rose after the dominance of the Keynesian approach that focused more on government involvement for the growth in the economies. The new classical model was closer to

the classical model and it focused on free markets, liberalization, economies of scale, and laissez-faire.

**New Economic Growth theories** have focused more on human capital and knowledge as a factor leading to an increase in technological innovation. Technological advancement leads to economic growth.

All these diverse theories that have piled up over the years point towards different factors that play a role in positively impacting the growth in one way or the other. In this study, we don't prefer a particular growth theory to work within but rather we affirm the consolidation of all as a wider and more holistic picture. A country must have enough savings for itself to utilize it on activities that could lead to growth. So, in our case, they would be invested in the infrastructure of that particular country or the region. The insights of Rostow and also Harrod and Domar are helpful. Secondly, it is also necessary that those investments are raised internally. The country must do its best not to fall into the cycle of external debts and domination. So, the inward-looking approach of the dependency theory is also a useful insight to consider. The other factors of growth whether human capital or technology as pointed earlier are also important. We cannot exclude any of those out in the modern economies. The goal of growth must imbibe in itself a systemic approach that considers all of those facets into consideration. The present work affirms of all that and focuses on a specific area of physical infrastructure and its relationship to growth reflected in the gross domestic product of the region. To sum up, the theoretical approach of this study lies firstly in the clinical economics approach. The clinical economics approach leads us to consider the region of Kashmir specifically and making a policy recommendation within that framework. And secondly, the theoretical approach of this study does not lie within a specific growth theory in modern economic literature but rather a wide range of positive facets within them.

The theoretical methodology of this thesis is taken from the work of Jeffery Sachs named 'The End of Poverty' that was published in the year 2005.

# Literature Review

The literature on the relationship between Infrastructure and growth/or development has been diverse particularly in the context of developed countries. Many studies have also focused on its conceptual and qualitative problems that subsequently translate into practical realities. Some of the important works that deal with the various nuances of Infrastructure, its relationship with growth, human capital, and others have been listed out below. Many other important works have not been mentioned here, only the ones most relevant to the inquiry and research of this particular study have been provided. We start with the work that deals with the most basic of the issues; the definitional problem in the literature about infrastructure, and its importance.

## Definition and Importance:

**Balwin and Dixon (2008)** have pointed out that there is no unanimous definition of Infrastructure. They point out that the literature on infrastructure generally ignores the question. The focus has been on what can rather be excluded from the realm of infrastructure. The literature is predominantly unequivocal on the inclusion of basic physical assets like roads, transport, electricity, and others within the ambit of infrastructure. But the variation lies in what is not included in infrastructure. Their paper goes on to give examples from OECD (Organization for Economic Corporation and Development), ASCE (American Society of Civil Engineering), and World Bank to show how each of them considers certain areas under the range of infrastructure without discussing why they included them while excluding others. They also show how at times public infrastructure is implicitly considered as something that has public ownership. They further go on to discuss the limitation of the notion that considers only physical infrastructure as a part of the public infrastructure. Some other resources and infrastructures are nonphysical and play an equally important role in the improvement of the quality of the life of people and wellbeing. They go on to discuss under this umbrella the environmental, social/cultural, and institutional capitals in the society. The lack of a well-formed and accepted definition is expounded as a problem in forming a coherent scale for studies and researches to base their work on. The lack of the definition leads to problems in studying the impact of infrastructure where the final results can be distinct based on what is studied as infrastructure, and also for policymakers in allocating the amount on

investments. The paper builds itself subsequently towards constructing a definition of public infrastructure. Certain characteristics are spelled out to work as a litmus test in this direction. It also touches on the discussion of what infrastructures are to be considered as 'public'. The paper further applies its infrastructural classification on the economy of Canada. The importance of this paper lies for our purpose particularly in its exposition on the definitional issues concerning the infrastructure and an attempt in reaching one. Such discussion and a clear base are often missing in the papers that deal with studying the impact of infrastructure on the growth or well-being of the economies.

**Alan Aschauer (1990)** in the paper 'Why Infrastructure is Important' attempts to show how infrastructure plays a positive role in creating a better quality of life and also achieve better economic performance. The paper studies these linkages by presenting the nuances such as how better roads lead to public safety by reducing the number of accidents, or for example better water systems having a relationship with health. The lack of better roads also leads to traffic jams that would eventually consume the time of people which could otherwise be used as leisure time and add subsequently to the productivity of the individual. Better and bigger prisons prevent the overcrowding of prisons, therefore, lesser crimes and also prevents early releases. The importance of infrastructure stretch to a wide variety of areas ranging from safety, health, aesthetics, and others, therefore, an indispensable part of creating a better quality of life. They present an empirical example from the years 1965-1983 for about 50 states to determine a relationship between output and infrastructural spending. Regression is carried out on the variables such as per capita output, capital-output ratio, and government spending. They divide the government expenditure into spending on core infrastructure and all other government spendings. They find a positive relationship between output per capita and government spending on core infrastructure. On the contrary, a negative and insignificant relationship between other government spending and output per capita was found. Some possible criticism and limitations of the results such as simultaneity bias are also discussed. The significance of the paper lies in its essential insights as to how better infrastructures lead to a better quality of life.

**The World Development Report (1994)** under the name 'Infrastructure for Development' is also a seminal work in the area of Infrastructure. It points to the relationship between the basic physical

infrastructure and growth (measured in GDP). It includes the following under the ambit of waterways.

1) Public utilities such as power, telecommunications, sanitation, piped gas, and some similar.
2) Public works such as roads, and major dams and canal works.
3) Other transport sectors such as railways, urban transport, port and waterways, and airports.

The report realizing the poor performance of current infrastructure brings in certain recommendations to increase efficiency. It includes adopting a business model against bureaucratic one, stimulating competition, providing a voice to the stakeholders, and recommending a changed role of the government. There is a particular emphasis on the point that given a positive relationship between infrastructure and economic growth it's not sufficient just to make the infrastructure available to expect higher returns. The infrastructure must also be efficient and responsive to the demands.

**Empirical Works:**

The pioneering work of **Aschauer (1989)** laid the empirical framework for the works to follow. The paper empirically proved that the basic physical infrastructures had a higher relationship with productivity in the US economy. The rate of returns shown in this study was very high; more than 50 percent and the slowdown in the US economy was attributed to the falling investment in the infrastructure. The work was criticized in subsequent studies by other scholars (such as Canning and Pedroni, and others) that added control variables. They still found overall positive relationships but with a lower rate of return. Nevertheless, the general conclusion of the study that infrastructure has a positive impact on productivity is generally accepted with variations that depend on the countries being studied and variables being introduced. Aschaur introduced a Cobb Doublous production to study the impact that is generally followed in most of the studies about this inquiry of infrastructure and economic growth. The paper used a time-series data from the year 1949-1985 in the US economy. He found significant coefficients 0.39-0.36. He studying the military expenditure concluded that military expenditure has an insignificant relationship with growth whereas core infrastructure such as roads, transport, water systems, highways, etc have a significant

relationship with economic growth. Public-sector capital is also shown as more productive than private capital.

**Canning and Pedroni (2004)** study a long-run relationship of growth and infrastructure on a panel of countries and conclude based on their analysis that on a general level there is a positive effect. Their study considers the interesting 'growth maximizing level' and also allude to the existence of some over-supplied or under-supplied infrastructure in individual countries. The data used is of the years 1950-1992. Gross Domestic Product per worker is used as an output variable. The Infrastructure variables used are based on annual data of paved roads measured in kilometers, electricity generation capacity, and the number of telephones. They approach the study based on the growth model developed by Barro who extended the endogenous economic growth model to include the government sector. They put it to a unit root test, and further also isolate the long-run effects to study its relationship in an isolated manner. By growth- maximizing level they mean that if a variable has already crossed that level, investments into that variable will have higher costs than the benefits. They make this study on a panel of countries to arrive at some average results. Their results demonstrate a varied outcome for paved roads and telephones. This implies that roads and telephones are already available at a growth maximizing level in some countries while in others there is a further scope of improvement. There is a need for country-specific studies to figure out if increasing investments in the infrastructure of paved roads and telephones will continue to have a positive impact on infrastructure. According to their investigation, some have under-supplied while others have over-supplied availability of these particular infrastructures; the diversion which explains the positive and negative results across countries. When it comes to electricity they found out that in most countries it showed a positive relationship in the long run. The results imply that in most of the countries there is a need for further investments in electricity generation, therefore, they are not at the growth maximizing levels.

**Ismail and Jamilah Mahyideen (2015)** studies the impact of hard and soft infrastructure on trade and various growth factors. They study the question in the backdrop of the increasing trade in the ASEAN countries and their trading partners. In their analysis, hard infrastructure includes physical infrastructure such as roads, ports, airports, railways, and also information and communication technology sector. The soft infrastructure includes the effectiveness of transport and matters of border manifested in the time, cost, and document requirement in the matters of trade.

They use the gravity model to study the impact of infrastructure on Trade. The data used is from the years 2003-2013. The following variables are mainly used to create an equation:

- Exports
- Exporters' and Importers' Real GDP
- Distance in kilometers between capitals of economies
- Exporters' and Importers' infrastructure
- Dummy for common languages and high-income exporters and importers.
- Relative endowment

Some of these variables mentioned above were used as proxies for capturing the market size (GDP's), development levels (relative endowment), and transport costs (Distance between economies). Others were used as dummy and control variables. Infrastructure was divided into two categories: hard and soft. And the impact of both was studied separately.

Parallelly the paper also studies the impact of infrastructure on growth in these Asian countries (ASEAN and their trading partners). The data is taken from the years 1971-2013. The following variables are utilized:

- Real GDP per capita as a dependent variable
- Population Growth
- Gross Fixed Capital Formation
- Trade openness
- Human Capital
- Infrastructure

The result from the gravity model including market sizes, common languages, dummies of high income, airport infrastructure for importers, road and port infrastructures have a positive and significant relationship with the trade.

As far as the impact of soft infrastructure on trade is concerned the results show that an efficient soft infrastructure would positively affect the trade. For example, the results show that a higher amount of documentation requirement reduces the amount of trade. There is a negative relationship. A similar effect was also found in the procedural requirements for imports and exports. The greater the time for finishing the procedures, the lesser the amount of trade. The study tends to point on the fact that along with hard infrastructure, the inefficiency in the soft infrastructure can also negatively impact the trade flows between economies, therefore, they need also to be dealt with and improved upon.

In the subsequent analysis of growth, road and air transport show significant and positive relationship with growth. The other factors studied also generally show a positive relationship. The results focus on pointing out that though the quantity of these variables does have a positive impact, the quality is also quite important in having productive and sustainable results.

**Derya Yilmaz and Isin Cetin (2018)** study the impact of infrastructure on 29 developing countries from the year 1990 to 2014. They use three-dimensional variables of infrastructure:

- Total Electricity Capacity
- Total Telephone Lines
- Length of Roads
- And GDP as a dependent variable

They construct an infrastructure index using Principal Component Analysis. And regression is carried out with a lagged value of GDP. Their empirical results show a positive and significant impact of infrastructure variables on per capita GDP across countries.

**Satyananda Sahoo (2000)** studies the impact of infrastructure on growth in the context of India from the year 1970-2000. The variables of Infrastructure used are

- Transport
- Gas
- Electricity
- Water supplies
- Communication facilities

A Cobb Douglas function is created and GDP is used as an output. The study utilizes a Vector Autoregressive Model to estimate the relationship between Infrastructure and GDP. In their results electricity, gas, communications, and water supply were seen to significantly explain the movements in GDP. Dash and Sahoo (2009) show in a similar study the positive impact of infrastructure on growth than private and public investments. They work under the framework developed by Aschaeur (1989) and construct an index of infrastructure. Their results exhibit that infrastructure stocks, labor force, and total investment contribute positively to economic growth. Aswini, Narendra, and Bibhu Prasad (2013) also study the impact of infrastructure on the economic growth of India. They use the data set of the years 1999-2009 and the following variables.

- Labor force
- Capital Stock

- Roads
- Railways
- Electricity, Gas, Water Supply
- Communication
- Irrigation
- Ports

GDP is used as a dependent variable. The carry out a factor analysis and see a correlation through the correlation matrix. Regression analysis is also carried out that exhibits the coefficient of infrastructure to be positive and statistically significant. Principal Component Analysis is used to see which set of infrastructures are more significant.

**Khan (2005)** had appealing results in the context of Pakistan. He found out a positive relationship between infrastructure and growth but also showed how countries with higher levels of investment in Human Capital show more productivity. It is concluded as one of the reasons why the economic growth in Pakistan is high whereas development is low. The study takes the data from the years 1980-2002 and a sample of 72 developing countries including Pakistan. The dependent variable is per capita GDP. The empirical analysis is carried out under the framework of the Cobb Douglas production function. Human Capital is represented in measures such as literacy rates, average schooling years, and life expectancy. The regression results indicate that higher levels of human capital have a positive and significant relationship with economic growths. Higher investments in Human Development and Health are suggested so that people can be more productive.

In another attempt to study the impact of Human Capital and Infrastructure on economic growth in Pakistan **Salma Munir, Ijaz Elahi, and Irfan Khan (2018)** carried out an empirical inquiry. They study the relationship in the long and short-run and find out that both Human Capital and Infrastructure development have a significant impact on Economic Growth in Pakistan. They take the time-series data from 1972 to 2013. Following variables are used in their study:

- Gross Domestic Product
- Total Employment/labor force
- Education Enrollment Index
- Health expenditures
- Gross Fixed Capital Formation
- Trade openness
- Infrastructure Index

An infrastructure index is created by carrying out a principal component analysis on the following infrastructure parameters:

- Number of Hospitals
- Road Lengths
- Ports
- Number of Universities
- Post Offices
- Telephone Lines
- Electricity Generation

After finding a positive relationship through the correlation matrix, the component loading values are added to construct the infrastructure index. The education index is constructed by giving 2/3 weight to adult education and 1/3 weight to the addition of primary, middle, and secondary. The study applies the Johansen Cointegration Technique. The results discuss the implications of investment in human capital. The higher the investments in education and health, the more productive the labor can be. Given a positive relationship proven in this study between Human Capital, Infrastructure, and Economic Growth in Pakistan, it can be safely asserted that Human capital investments are as much important as the Infrastructure investments in the context of Pakistan's economy.

**Sahoo, Dash, and Geethanjali (2010)** carry out a similar analysis on the Chinese economy and reveal a positive contribution of both physical infrastructure and human capital on the economic growth of this fastest-growing economy. It spells out, therefore, the importance of investment in infrastructure and human capital for massive growth. It's based on the production function framework with Gross Domestic Product, domestic private and public investment, total labor force, and indexes created of infrastructure and human capital. The infrastructure index is created using the principal component analysis using the following variables:

- Electricity power consumption
- Per Capita energy use
- Telephone Lines
- Railway
- Air transport
- Paved roads

This study has been made from the year 1975 to 2007. They use GMM (Generalized Methods of Moments) and ARDL (Autoregressive-distributed Lag Model) techniques. The paper concludes on the note that justifies the high amounts of public spendings on physical infrastructure in the Chinese economy and also mentions it one of the reasons why the growth is high in China.

**Maria Jesus (2001)** works on the question of the level effect of human capital accumulation and growth. They do an empirical study and find out a relationship between human capital accumulation and economic growth considering the level effect. (The direct impact of increased human capital in increasing productive output). The work on data across a wide range of countries from the years 1960 to 1990. A significant direct impact of education on economic growth is found. Manoj, Bin Grace, Ricardo, and Giovanni (2019) also study the interesting question of School vs Roads investments. They show that Schools have a higher rate of return in the long run and yet governments spend much higher on basic physical infrastructure. They try to understand the reasons behind such decisions of the government and point out debt intolerance (especially in developing countries) and political myopia as primary reasons for such decisions. They pointed out that there return on road investment usually takes around 9 years to manifest in the growth levels while at the same time for schools to manifest a similar amount of return it takes about 20 years. It has debt implications for the governments in the short run periods. The return on school on a longer scale is higher but for governments for reasons of vote banks as well it can have implications that hamper them to invest more in schools. The political leaders maneuvering the provisions to get re-elected is also a problem. The paper also points out the voter ignorance on these matters as they also use current GDP's to evaluate their success where the current investments have a more beneficial result in the long run. These dynamics playing at the political level adds to the debt intolerance and political myopia working in society. The paper advances the use of multilateral agencies trying to resolve the problem by providing incentives to policymakers to implement policies that are more considerate of a longer time frame. They use the general equilibrium model to show how roads and schools could be contributing to economic growth at different levels. The works of Charles R. Hulten, (1994) Bills and Klenow (2000), Kumar Mishra and Prasad (2013) and others also dwell on the analysis of the relationship between physical capital and human capital with growth and productivity. Some of these studies analyze in a country-specific context, while others take a wider group of countries in trying to understand the relationship. For example Bills

and Klenow study the question of whether schooling causes growth in a cross-country relationship analysis and they also try to investigate the reverse causality effect.

**Critical Problems:**

**William Ascher and Corinne Krupp (2010)** raise pertinent critical questions to be considered while framing the policies about investment. While it's true that the literature generally proves a positive relationship between growth and infrastructure, they ask whether investing makes sense in all conditions. They point towards the various gaps between the policies and the results. The implementations are usually not good quality both in developing and developed countries according to them. They also point that we cannot look at infrastructural investments in isolation, they are often connected with other important factors. They give examples of how investment in airports would not be sensible if it's in an area prone to flooding or investments on dams without having proper plans for displaced people, and many other such disconnections. The question seeking which section of the society bears the burden and who gets to benefit is important. It also points out that an improvement in growth through infrastructural investment might not necessarily deal with the problem of poverty alleviation and equity. While their work does not negate the importance of these investments but analyzes conditions that might impact a country about policy framing considering their current economic situation. Their work also points out the vulnerability of the studies examining the impact of infrastructures on the growth as it points out that they have to base it on certain assumptions. They also point to variations of results across the studies. Proper results would also be difficult to achieve if the economies are prone to high levels of corruption. They also make a comparative analysis of Indian and Chinese infrastructure investment experiences and study the questions of the impact of infrastructure on poor sections of the society.

# Infrastructure and Developing Countries

## Defining Infrastructure

Infrastructure does not share any common definition throughout the literature. There is, in fact, hardly any attempt seen to define it in the studies that inquire about the relationship between infrastructure and economic growth. A certain number of assets are chosen to be within the ambit of infrastructure, and a subsequent study is made. The assets chosen to be representing infrastructure are also diverse. Over the years the scope of what is included within the category of infrastructure is expanding. As pointed out by Balwin and Dixon, there is no dispute about whether core assets like roads, airports, electricity, dams and similar are a part of the infrastructure or not. Everybody unanimously agrees in their inclusion. But the disagreement lies in what assets are excluded from the ambit of infrastructure and why.[9] Most studies choose a certain set of assets while excluding others without any set criteria on why they are choosing some over others. There is no denying the fact that the assets mentioned earlier hold importance, but the question arises that there can be assets in the society that might have similar importance. What makes us not include those in the realm of infrastructure. The studies have over the years seen a rise in the inclusion of assets like human capital and health as part of infrastructures. Considering these discrepancies Balwin and Dixon have pointed out some problems a lack of definition can create. Without a proper definition, it is difficult for researches to study the proper impact of what can be classified as infrastructure, and secondly for policymakers to make the investment decisions.[10] Criteria that make an asset infrastructure need to be spelled out and assets must be classified accordingly. The World Development Report (1994) while defining infrastructure includes the following under the category of infrastructure.

*Public Utilities: power, telecommunications, piped water supply, sanitation and sewerage, solid waste collection and disposal, and piped gas.*

*Public Works: roads and major canal and dam works for irrigation and drainage.*

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[9] Baldwin J.R., & Dixon, J. (2008). Infrastructure Capital: What Is It? Where Is It? How Much of It Is There? *Research Paper Research Paper Series (16)*

[10] Ibid

*Other Transport Sectors: Urban and interurban railways, urban transport, ports and waterways, and airports.*[11]

The report also points out that there is no precise definition of infrastructure. This again reiterates the point of Balwin and Dixon as to how studies have chosen some assets over others as infrastructures without set criteria. Balwin and Dixon pointing out certain characteristics of the assets construct the following definition of infrastructure:

*"A set of fixed structures with specific characteristics---that have long useful lives; whose creation involves a considerable gestation period; that have no good substitute in the short run; and that underpin the production of a flow of services, for which it is difficult to maintain inventories. These assets also have a special foundational role, supporting other factors of production."* [12]

Although it's a useful definition, it also creates certain limitations. Intangible assets such as education will have to be valued in terms of quantity and not quality. For example, education would be considered only as infrastructure in terms of the number of schools or colleges. It might follow that the investment in education as infrastructure must focus on increasing the quality of education, and not necessarily, the number of schools or colleges. For example, an investment in exchange programs can result in students learning about new cultures, new languages, and foreign students arriving in the home country becoming aware of local culture and language. It stimulates a positive relationship between the two countries in the long run and the possibilities of trade increase. Better relations between countries and trade subsequently leads to an increase in economic growth and well-being. In the security infrastructure, investing more in police and prisons might not be the best depiction of infrastructure. The mindset of people and mental well-being that would lead to more security can be very non-tangible. The definition limits the infrastructure to only those that can be defined and valued in physical terms. But the same logic of the importance of other assets, both tangible and nontangible, that could have a positive impact on the economy can be immense in number. Nevertheless, the definition is useful for considering the physical infrastructures but still

[11] World Bank (1994). Infrastructure for Development. *World Development Report 1994.* Published for Washington D.C. World Bank by Oxford University Press, New York., pg 2.
[12] Baldwin J.R., & Dixon, J. (2008). Infrastructure Capital: What Is It? Where Is It? How Much of It Is There? *Research Paper Research Paper Series (16).,* pg 8.

is not holistic enough to define infrastructure as a whole. While dealing with the idea of infrastructure we need to perhaps distinguish between the various kinds of infrastructure and the nature of each kind. Another very useful way to look at the infrastructure is through the lens of shared infrastructure explicated by the work of Brett F. Freishmann in his book. [13] Infrastructure is a wide range of things that people share in common. From obvious things such as roads, bridges, electricity, water supply, to less obvious things such as the legal institutions, common languages, ideas, and also the atmosphere.[14] All these things contribute to the life of the people, create opportunities and various relationships, and therefore add to the economic well-being. Thinking in these terms about the infrastructure makes us look at it in a very broad sense of understanding. Among this broad category, we can therefore further divide the kinds of infrastructures between those which can be called physical infrastructures and others. The following are some of the basic classifications of infrastructure in the literature.

**Hard/Physical Infrastructure**: All physical assets such as roads, electricity, telecommunications, bridges, water systems, post offices, and the likes have been categorized in the literature as Physical or Hard Infrastructure. They are essential to the basic working of an economy and are without doubt indispensable for the betterment of the economy. There has been mounting evidence of a positive relationship between growth and physical infrastructures across many countries. Brett Fenman names them as traditional infrastructure in his book and delineates how societies derive value from them. For example, roads are essential to facilitate movements, and movements create opportunities. The movements create possibilities for people to participate in economically and socially valuable activities. The better the road networks, the easier and greater the participations become. Commerce is the foremost example of such an activity.[15] The activities like commerce and others have their positive externalities that help the economy grow. The word infrastructure generally brings assets that relate to physical infrastructure in mind, but over the years there has been an essential shift to the other form of infrastructure as well.

[13] Brett M. Frischmann (2012). *Infrastructure: The Social Value Of Shared Resources.* Oxford University Press.
[14] Ibid., pg 9
[15] Ibid., pg 189

**Soft/Social Infrastructure:** Those infrastructures that become the basis of cultivating the physical infrastructure can be referred to as the soft or social Infrastructure. It can also be defined as all those services that are essential to maintain human standards in society. The human capital and institutions are the common form of assets categorized under this category. They can imbibe both physical and non-physical factors. Things like legal institutions, common languages, ideas as mentioned earlier can be categorized under this ambit of infrastructure. The factors like documentation requirement and efficiency while carrying out trade are also studied as soft infrastructure.[16] KV Kamath while spelling out the importance of soft infrastructure mentions the following:

*"... impact of soft infrastructure is critical. It is the building block to successful infrastructure development and, more importantly, it helps make sure what has been created is run successfully. The whole issue, in a way, starts with the question: are the ground conditions right to set up an infrastructure project?"* [17]

The reference to the 'ground conditions' above relates to the soft infrastructure. In other words, we can say that soft infrastructure lays the foundation of the hard infrastructure to follow. And therefore, it demands equal attention in the research studies and policies as well. There are areas within the soft infrastructure where valuation and the subsequent impact on society are difficult to study and pose a big challenge. There have been many attempts now to study the impact of human capital. And the results, in the long run, are generally shown to be positive. This distinction between the two kinds of infrastructure is essential while defining what infrastructure is, and for understanding what the scope of infrastructure can be.

## Infrastructure in Developing Countries

Investment in infrastructure is increasingly being recognized as immensely important, and especially in the case of developing countries. The quality and quantity of infrastructure can have higher relations with development and growth. The current state of infrastructure in the developing

[16] Ismail, N.W., and J.M. Mahyideen. 2015. The Impact of Infrastructure on Trade and Economic Growth in Selected Economies in Asia. *ADBI Working Paper 553.* Tokyo: Asian Development Bank., pg 25.
[17] K.V. Kamath. *Journel of Infrastructure, Policy and Development (2017) Volume 1, Issue 2.*

world seems to be unsatisfactory and needs a lot of exploitation for the good. Infrastructure investment has taken place in the 2030 development agenda. The Sustainable Development Goals specifically mention *"Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation". "Ensure availability and sustainable management of water and sanitation for all"* and *"Ensure access to affordable, reliable, sustainable and modern energy for all"*[18]

The following are some of the infrastructure constraints recorded by the emerging markets and the low-income developing countries.

**Table 2**

| Countries: | AEs | EMs | LIDCs |
|---|---|---|---|
| Percentage of Firms | | | |
| Identifying electricity as a major constraint | 14.6 | 26.3 | 39.3 |
| Experiencing water insufficiencies | 4.6 | 12.8 | 22.1 |
| Identifying transportation as a major constraint | 9.2 | 15.0 | 22.1 |
| Number of surveys | 33 | 165 | 114 |
| Change in the percentage of firms: | | | |
| Identifying electricity as a major constraint | -7.2 | -10.5 | -9.4 |
| Experiencing water insufficiencies | -2.7 | -2.3 | -5.4 |
| Identifying transportation as a major constraint | -6.7 | -2.5 | -0.1 |
| Number of survey pairs | 6 | 48 | 41 |

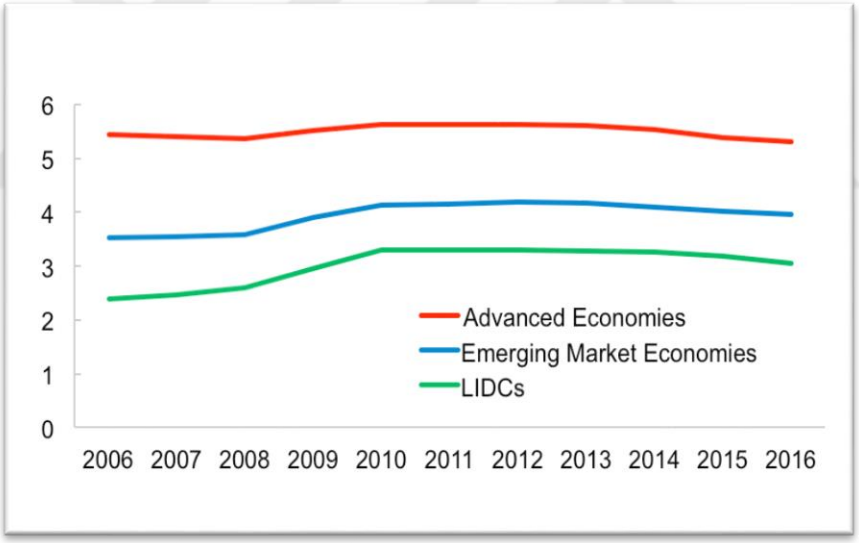
Note: The top panel reports simple averages of all available country-representative surveys, over the period 2006-2016, by country groupings. The bottom panel reports changes between the most recent surveys and the first one, starting in 2006. Then, the initial and final year changes because of data availability. Only countries with at least two surveys since 2006 are considered.

Source: Di Liddo, Giuseppe. Rubino, Alessanro, Somma, Ernesto (2019)

[18] Sustainable Development Goals (SDG'S) 6, 7, and 9. Development Agenda 2030

Though there is a reported improvement in the infrastructures of the developing world, there is still a wide gap between the quality of infrastructure in advanced economies and both emerging and low-income developing countries. And a lack of the quality of infrastructure leads to various gaps and constraints that hamper the possibilities of increased economic activities. The following graph shows an infrastructure quality assessment on the index of 1-7. There is hardly any progress seen in the infrastructure quality since 2010 of both emerging markets and low-income developing countries. Subsequently, the gap between the quality of developed economies and the developing economies hasn't improved.

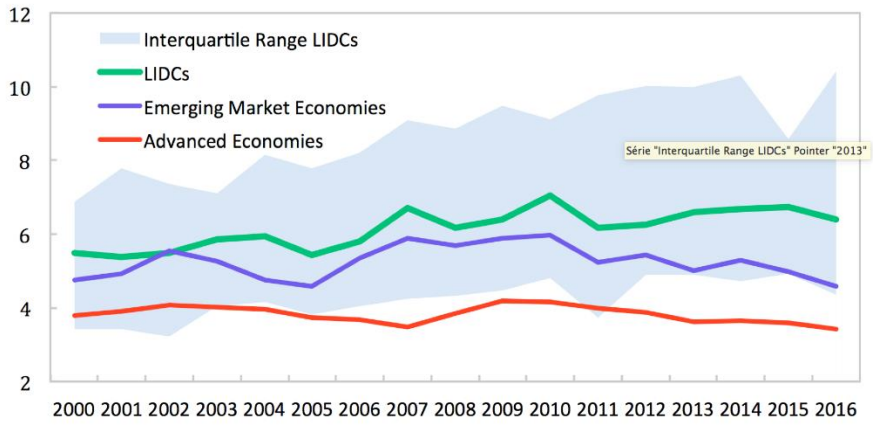
**Figure 1**




Source: Schwab (2016)

The investment in infrastructure in developing countries is mostly carried out by the public sector. The highest involvement of public sector investments in infrastructure is seen in low-income developing countries followed by emerging markets. Public investment in the percentage of GDP is depicted in the figure below. Other than the years of financial crises, there is an increasing trend of public investment in low-income developing countries as a percentage of GDP.

**Figure 2**




Sources: Trends and Challenges, IMF

It follows from the above representations that there is a need for infrastructural improvement, particularly in developing countries. A large gap of economic potentialities can be realized if these gaps are filled with proper policy formulations and implementations on the infrastructural level. As shown in the figure above, its often public sectors that have been highly involved in infrastructure investments in developing countries. A consideration of the private sector playing a positive role can also be explored depending upon the particular country's situation and possibilities. There are also empirical studies that have been carried out depicting a positive impact of infrastructure improvements on economic growth. Isin Cetin and Derya Yilmaz (2018) [19]carried out a study on the data of 29 countries that have been categorized as middle-income countries by the World Bank. These countries include the following:

*Egypt, Turkey, Sudan, Thailand, India, China, Pakistan, Jordan, Indonesia, Armenia, Azerbaijan, Malaysia, Belarus, Macedonia, Bosnia, Bulgaria, Brazil, Kazakhistan, Romania, Iran, Albania, Iraq, Nigeria, Mexico, Uzbekistan, Ukraine, Kenya, Bangladesh, Syria.*

They have used the available data of the years 1990-2014. The following indicators were used in their analysis. The infrastructure index is constructed with the Principal Component Analysis.

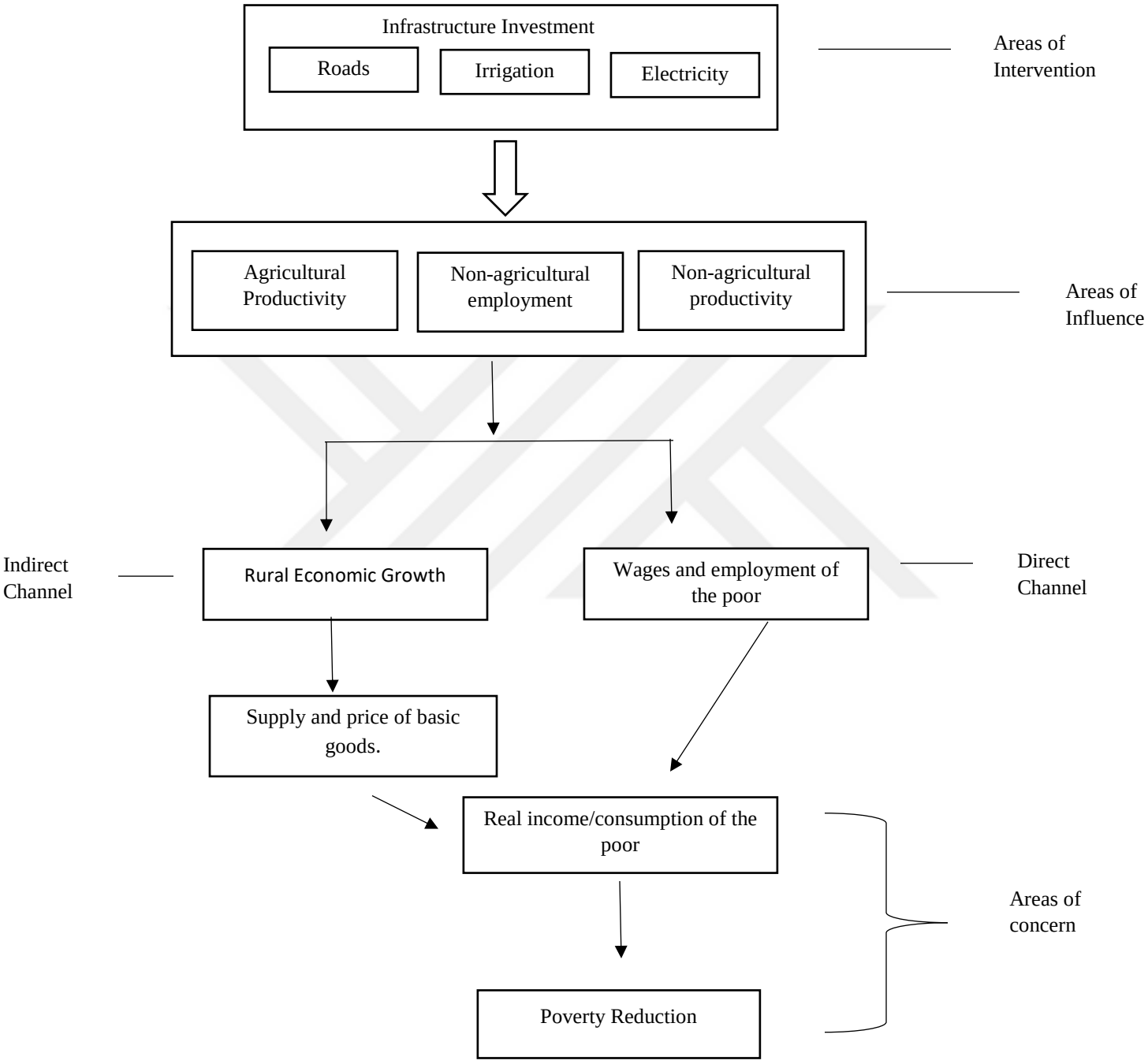
[19] Derya Yilmaz and Isin Cetin (2018). *The Impact of Infrastructure on Growth in Developing Countries: Dynamic Panel Data Analyses.* Uludag University.

Electricity Generating Capacity, Lenth of Roads, and telephone lines are used as infrastructure variables. The following are used as control variables.

- Trade Openness (Share of import and export in GDP)
- Education (gross enrollment rates)
- Financial Development (private capital/GDP)
- Inflation (CPI)
- Government Consumption (government expenditure ratio in GDP)
- Political Risk Index

The impact of Infrastructure on the lagged value of GDP per capita is studied through regression analysis. The find a significant effect of infrastructure on growth. They have used GMM estimators. The coefficient comes out to be 0.056. The control variables are also found to be having high significance. Education has a 0.148 coefficient which is a high significance. The results and discussions represent that a higher investment in infrastructure would lead to a higher GDP per capita growth across the developing countries. Other comprehensive empirical studies also show a similar pattern of positive results. Poverty is one of the major challenges that developing countries go through. It's also argued in some of the studies that infrastructure also plays a role in poverty reduction. For example, the following figure represents how infrastructural growth leads to poverty reduction.

**Figure 3**




Source: Ali and Pernia (2003)

Although, as pointed out by Louis Y. Pouliquen (2000), "*while there may be a clear link between infrastructure and growth, the link with poverty is neither automatic nor necessarily direct.*[20] In developing countries with high and multidimensional poverty and impediments to the lack of infrastructure itself, considering infrastructure alone to resolve the problem might be a problematic claim. However, combined with relevant supporting policies infrastructure can help in the poverty reduction efforts.

**A Case of India.**

The studies mentioned earlier in this work are usually carried out on the panel of countries, and an average result of them all is considered to explain a phenomenon. In this section, we look at some of the studies carried out on the specific country of India that deal with studying the relationship between infrastructure and economic growth. As it was pointed out earlier as well, for policy implications studying the impact of infrastructure on that particular economy is essential. It is also essential to consider the situations and conditions relevant to that economy to arrive at a fruitful policy decision. India is a part of the developing world and is considered to be one of the largest economies in the current map of the world. It was recorded to be the fifth largest economy in 2019.[21] Infrastructure is one of the key sectors in India and is considered to be an important force for moving the Indian economy forward. India was also ranked 44$^{th}$ among 167 countries in the World Bank's Logistic Performance Index, 2018.[22] In the Union Budget of 2019-20, India planned to spend 1.4 trillion US dollars in the next five years on infrastructure. Allocations to different infrastructure sectors were also announced. India's GDP growth over the years has been substantial.

[20] Lous Y. Pouliquen (2000). Infrastructure and Poverty, Internal Document, World Bank,. Pg 7.
[21] World Econimic Outlook, IMF, October Edition (2019)
[22] https://lpi.worldbank.org/

**Figure 4**

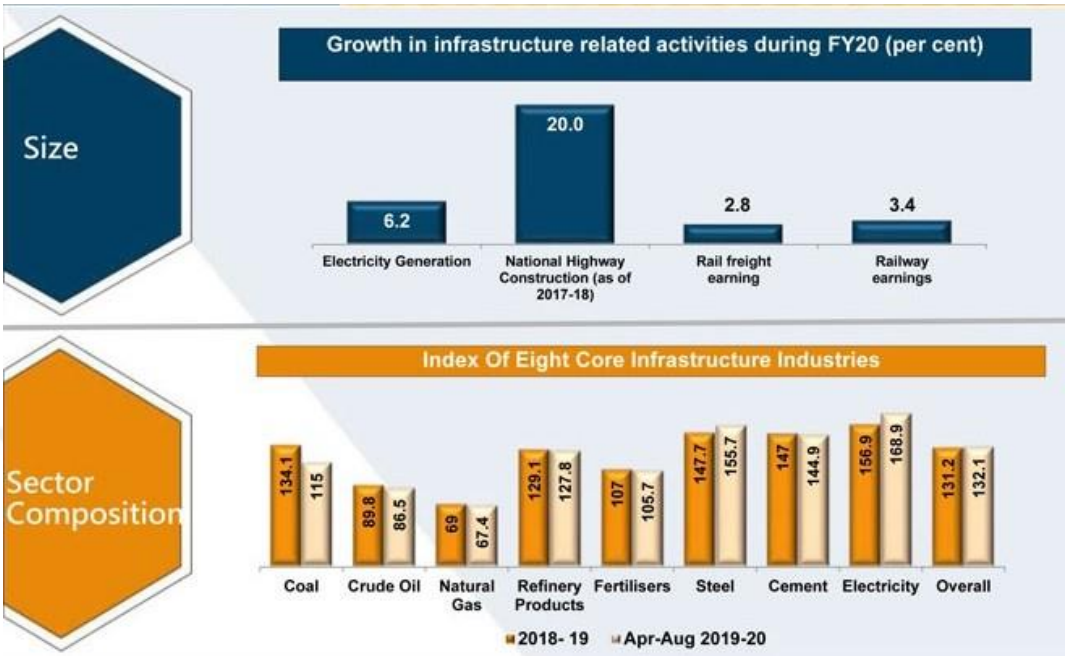



Source: IMF; 2019, World Economic Outlook (October 2019)

The Indian Economy is engulfed with paramount difficulties as well. Inflation rates have reached high levels. This amounts to the falling of GDP in real rates. Access to the development is uneven, only 39% of the rural population are reported to have access to sanitation. The recorded poverty rates are one of the highest in the world. Given this situation, it becomes important for the country to not just speak about infrastructural investment but also work on how it can become accessible to all. Nevertheless, there has been a growing trend in infrastructure investment in the country. Government initiatives like PMAY –Urban Housing for All, Smart City Project, and UDAY – Ujwal Discoms Assurance Yojna have been worked upon. There are also initiatives to be implemented on road constructions that seek to connect all villages in India. There is a plan to upgrade 1,25,000 KM of road length.[23] According to the Infrastructure sector report it's expected that by 2022 India will become the third-largest construction market in the world[24]. The composition and size of infrastructure across various sectors are depicted in the following diagram.

[23] Indian Infrastructure Sector in India Industry Report (December, 2019)
[24] Indian Infrastructure Sector in India Industry Report (December, 2019)

**Figure 5**




Source: ibef.org

Dash and Sahoo (2009)[25] worked on an empirical analysis of the impact of infrastructure on economic growth in India. They followed the empirical framework constructed by D.A Aschauer (1989). The study is made for the period 1970-2006. They spell out the need for the Indian Economy to enhance Infrastructure. They point out that India is behind vis-à-vis many other developing countries in providing infrastructure facilities.

[25] Sahoo, P and Dash, R.K. (2009). Infrastructure Development and Economic Growth in India. *Journel of the Asia Pacific Economy,* 14(4) pg,. 351-365.

**Table 3**

| | Electric power consumption (kwh per capita) | Energy usage (kg of oil equi. per capita) | Paved Roads (% of total roads) | Total rail route '000 sq. km) | Air Freight (million tons per km) | Air transport ('000 population) | Total telephones (Per '000 persons) |
|---|---|---|---|---|---|---|---|
| Countries | 2005 | 2005 | 2005 | 2005 | 2006 | 2006 | 2006 |
| India | 480.5 | 490.9 | 62.6 | 21.5 | 842.6 | 40.3 | 186 |
| Bangladesh | 135.5 | 157.8 | 9.5 | 20.22 | 190.8 | 17.2 | 129 |
| Sri Lanka | 377.7 | 476.6 | 81 | 14.5 | 325.4 | 31.9 | 366 |
| Pakistan | 456.22 | 490.91 | 64.7 | 10.1 | 426.7 | 57.14 | 249 |
| Nepal | 69.53 | 338.45 | 56.8 | 0.41 | 7.21 | 23.23 | 592 |
| China | 1780.52 | 1316.3 | 81.6 | 6.84 | 7692 | 112.41 | 631.37 |
| Korea | 7778.6 | 4426.5 | 76.82 | 33.69 | 7751 | 784.4 | 1385 |
| Indonesia | 509.31 | 813.8 | 59.00 | ------ | 469.2 | 143.10 | 352.5 |
| Malaysia | 3262.4 | 2388.72 | 78.9 | 5.07 | 2597.22 | 713.98 | 911 |
| Thailand | 1988.1 | 1587.9 | 99.17 | 7.89 | 2106.5 | 363.82 | 754 |

Source: Dash and Sahoo (2009)

They use a production function method to carry out the study. A Cobb Douglas production function is constructed. They have used the following variables in creating an infrastructure index:

- Electricity Power Consumption
- Telephone
- Energy Usage
- Rail Density
- Air Transport
- Paved Road as a percentage of Total Roads

The infrastructure index is constructed using the Principal Component Analysis. The factor loadings of the original value are used.

The production function where output is a function of public and private capital, Infrastructure index, and the Labor force is presented.

The results of this regression analysis were found to be very significant. The coefficients of labor, capital, and infrastructure were all found to be positive and significant. The results imply that an increase in any of these factors would positively impact output, and therefore, lead to higher growth levels. They also point out that as there is a huge deficit in the infrastructure sector in the Indian economy, any increase would substantially expand output. India went through a phase of liberalization starting from the years 1991. The study also introduces a dummy variable to check for the elasticity after the 1991 substantial changes in the economic mechanisms. The results were still found positive and there was a significant change in elasticity as well. They concluded the reform dummy to be justified. They recommend higher investments in infrastructure in India. Given the positive relationship in India between the infrastructure and growth, it's also a point of concern about how India lags in providing access and facilities to its population. The situation of India in comparison to some other developing countries is given below.

**Table 4**

| | Electricity | Water | Sanitation | Teledensity | Road Density (by population) | Road density (by area) |
|---|---|---|---|---|---|---|
| Afghanistan | 5 | 13 | 8 | 12 | | 32 |
| Bangladesh | 25 | 75 | 48 | 16 | 1.6 | 1594 |
| Cambodia | 10 | 34 | 16 | 38 | 1 | 70 |
| China | 97 | 77 | 44 | 424 | 1.4 | 189 |
| India | 40 | 86 | 30 | 71 | 3.2 | 1115 |
| Indonesia | 80 | 78 | 52 | 127 | 1.7 | 203 |
| Myanmar | 5 | 80 | 73 | 8 | | |
| Nepal | 15 | 84 | 27 | 18 | 0.6 | 107 |
| Pakistan | 55 | 90 | 54 | 44 | 1.8 | 334 |
| Sri Lanka | 75 | 78 | 91 | 122 | | |
| Veitnam | 60 | 73 | 41 | 88 | 1.2 | 287 |

Note: Electricity (percentage of the population access to the network, water (percentage of the population access to improved sources), sanitation (percentage of the population access to improved sanitation), teledensity (fixed-line and mobile subscribers per 1000 people), roads (percentage of the rural population living within 2km of an all-season road).

Source: Jones, 2006

Other empirical findings[26] that work on various infrastructure variables and time frames also manifest similar results. In their concluding remarks, they have recommended a reduction of *'Bottlenecks in Supply'*[27]and a feasible form of PPP (Public-Private Partnership).[28]

Srinavaso (2013) argues that an increase in Infrastructure has led to an externality of the reduction of poverty in India. They present the data of the various states in India and show how the states with better infrastructure have a lesser ratio of poverty. It can be seen in the representation of the following figures:

**Table 5**

| States | Index of Infrastructure | HeadCount Ratio of poverty |
|---|---|---|
| Punjab | 185.5 | 9.2 |
| Kerala | 178.5 | 13.3 |
| Tamil Nadu | 149.1 | 22.9 |
| Haryana | 137.5 | 13.6 |
| Gujarat | 124.3 | 19.1 |
| Maharashtra | 112.8 | 29.6 |
| West Bengal | 111.3 | 28.6 |
| Karnataka | 104.9 | 20.9 |
| Andhra Pradesh | 103.3 | 11.2 |
| Uttar Pradesh | 101.2 | 33.4 |
| Bihar | 81.3 | 42.1 |
| Orissa | 81.0 | 46.8 |
| Assam | 77.7 | 22.3 |
| Madhya Pradesh | 76.8 | 36.9 |
| Rajasthan | 75.9 | 18.7 |

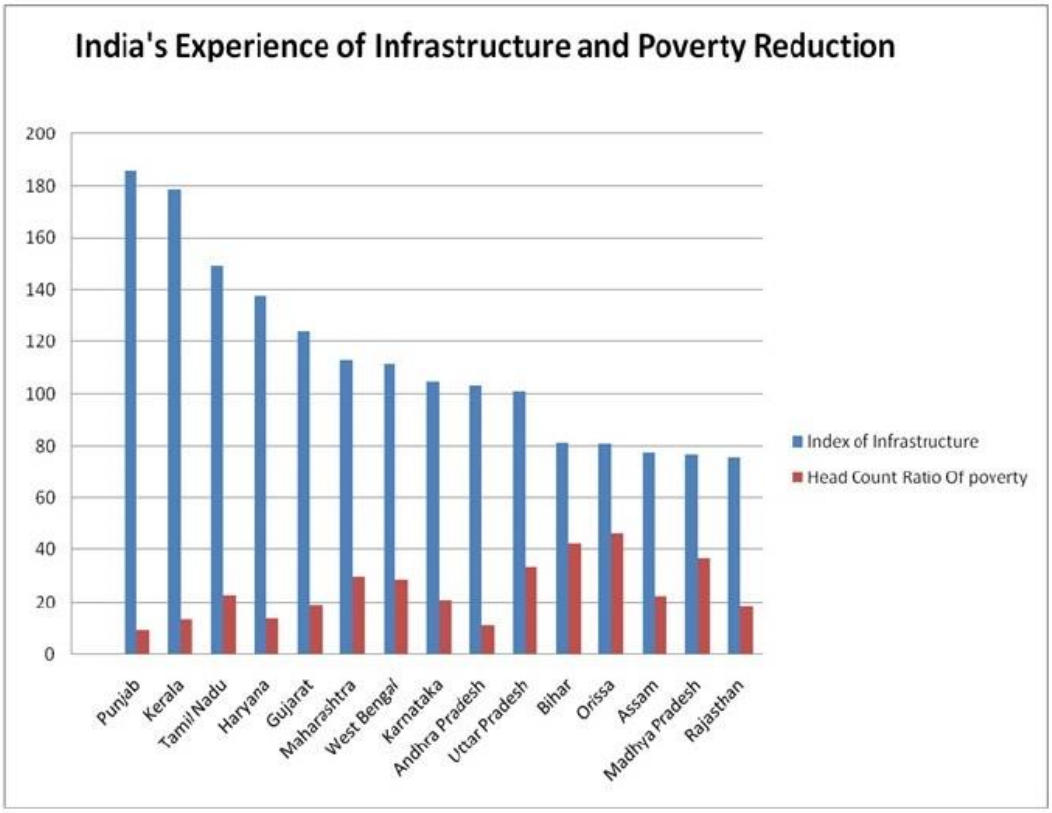
Srinavas (2013)

In the above table, the developed states like Punjab, Kerela, and others have a higher index of infrastructure and a lower count ratio of Poverty. And in the states with a lower index of

[26] Works like Aswini Kumar, Kunapareddy. Bibhu Prasad (2013), and Dr. B. Srinivasu and P. Srinivasa Rao (2013)
[27] Satyananda Sahoo, *Infrastructure and Economic Growth: An Empirical Examination.,* pg 17.
[28] Aswini Kumar, Kunapareddy, Bibhu Prasad (2013). Growth and Infrastructure Investment in India : Achievements, Challenges, and Opportunities. *Economic Annals, Volumne LVIII, No. 196/ 2013*

infrastructure, the ratio of poverty is higher. The relationship is also presented clearly in the following graphical representation.

**Figure 6**




Source: Srinavas (2013)

They conclude from this relationship that infrastructure development has led to poverty reduction in India. The conclusion based on this evidence is problematic because they haven't considered the possible causality effect. And it might just be the case that the ratio of poverty is lesser in these states because of the higher development arising due to a variety of other factors. Higher development also could have resulted both in greater infrastructure index and reduced poverty. The linear relationship of higher investment in infrastructure leading to lower poverty is not properly established here but appears more like a possibility or a guess. Nevertheless, as pointed out earlier that evidence for a link between infrastructure and growth is strong, but it's not established necessarily for poverty. A multidimensional approach to poverty reduction must be sought after in

the context of India as well. Improving infrastructure with the hope of an automatic reduction of poverty may be a slippery slope to follow. The above figures establish that developed states in India have a higher index of infrastructure and low poverty levels as well. A comprehensive research work studying these states, their economic activities, their policies, their differences from other states, and the causality between the factors of growth, infrastructure, and poverty can be very useful for other states to follow as a guide towards the goals of reduction of poverty, and development in India. For a developing country, sustained high growth rates are also essential. And at the same time efforts on poverty reduction demand equal importance. The best way for such an economy is to seek a balance between redistribution policies and growth policies. Choosing one over the other in an unproportionate manner might give a deep wound especially to a growing economy.

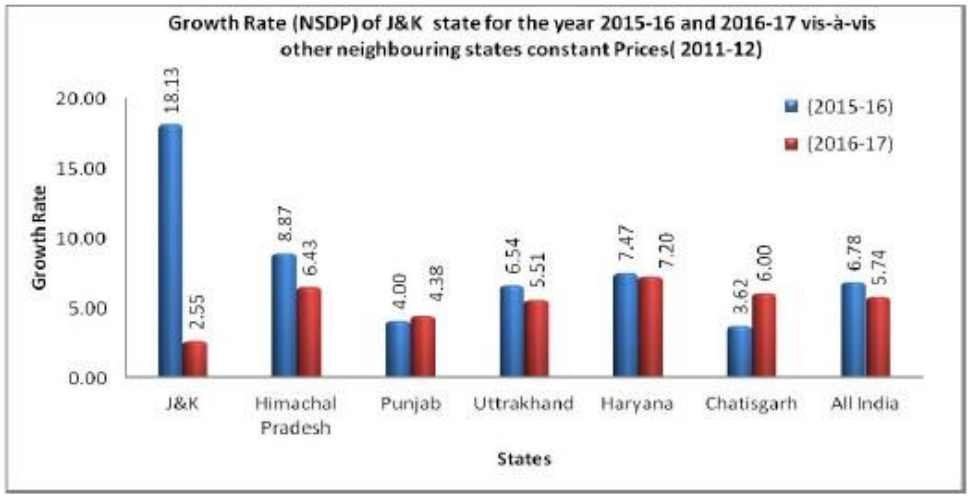
# Infrastructure in the context of Kashmir's Economy

# And the Policy Framework

Kashmir is a region found in the northern region of India and Pakistan. It has been a disputed territory since the independence of India from the British. The subsequent war in 1948 between India and Pakistan led to a ceasefire from the UN (United Nations) that divided the region. This study is concerned with the region that comes under the de-facto administration of India. The region of Jammu and Kashmir under the Indian Territory has a population of 12.55 million and covers an area of 222,236 sq. km[29]. The region is a base of vast resources and traditional industries. It has a suitable condition for good horticulture and floriculture development. It's also considered as a sought after tourist destination. The political turmoil has created some difficulties in the place but still, the overall growth rate is increasing and the literacy rate is comparatively high compared to other states of India[30] Agriculture is the major source of employment and livelihood in the state. 70% of the state population lives in rural areas and depends on Agriculture[31]. The region has economic potentials that are unrealized and infrastructure is one among them that can positively impact the economy. This study recognizes the lack of infrastructure development in the region and tries to show a relationship between infrastructure and GDP growth in the region. The Fiscal revenue that comes as a grant in aid from the union government was recorded to be 49% in absolute terms during the year 2016-2017. The other sources of revenue of the state are its tax and non-tax revenues. The relative comparison of the growth rate of the region of Kashmir with other states of India is reflected in the following graph. In the given graph there is is a substantial fall in growth rate in the year 2016-2017. The year was full of political turmoil.

[29] https://jk.gov.in/
[30] a literacy rate of 67.16%
[31] Economic Survey (2017)., pg 77

**Figure 8**




Source: Economic Survey 2017, Government of Jammu and Kashmir

This inquiry hypothesizes that the infrastructure impacts positively on the economic growth in the region.

**Data Sources and Descriptions:**

The consistent data pertinent to this study is limited. Considering the lack of consistency and limitations within the data, the recent data from the year 2000 to 2017 is taken. The data is taken from The Economic Survey (The Government of Jammu and Kashmir) 2017, 2016, and various years. Regional Indicators 2016-2017 (The Government of Jammu and Kashmir), and the Regional Digest of Statistics 2016-2017 (The Government of Jammu and Kashmir). This study, therefore, based on data available carries out possible analyses to come up with some conclusions and recommendations. The following data indicators are used as variables in the study:

Dependent Variable

- Gross State Domestic Product (GSDP)

Independent Variables

- Length of Roads

- Electricity Generation
- Number of Vehicles
- Telephone Lines
- Electricity Generation
- Post Offices
- Education Enrollment
- Working Force
- Capital Expenditure
- Number of Medical Institutions

**Methodology:**

The correlation of the dependent variable GDP with other independent variables is checked using the correlation matrix. The log values of all the variables are calculated and then used in a multi-variable regression analysis to find the significance of independent variables on the dependent variable. A step-wise method is used that only extracts the significant values in multivariable regression. The results are subsequently interpreted and some conclusions are presented. All the analyses are carried out in the SPSS software. The chosen method for the empirical analysis was the most suitable given the data constraints. The data is not available in a consistent manner over a longer period, nor it's efficiently collected. Therefore, a longer time series analysis couldn't be carried out. At the same time for this inquiry, other empirical methodologies like panel data analysis were also not suitable.

**Empirical Analysis:**

Through a correlation matrix given below, it can be seen that the correlations between GDP and most of the other variables are very significant. The first column of the table is the representation of the correlation of GDP with other variables taken in the study. Most of the values are 0 or some others like post offices, telephone lines, and capital expenditures are quite close to it. It signifies and represents a positive correlation.

**Table 6**

**Correlation Matrix**

| | GDP | CapEx | EduEnroll | WorkingForce | Med.Ins | Roads | Vehicles | PostOff | TPLines | ElecGen |
|---|---|---|---|---|---|---|---|---|---|---|
| Gdp | | .152 | .003 | .000 | .001 | .000 | .000 | .006 | .122 | .000 |
| CapEx | .152 | | .024 | .056 | .340 | .116 | .150 | .108 | .185 | .413 |
| EduEnroll | .003 | .024 | | .000 | .226 | .001 | .002 | .022 | .313 | .049 |
| WorkingForce | .000 | .056 | .000 | | .047 | .000 | .000 | .022 | .384 | .002 |
| Med.Ins | .001 | .340 | .226 | .047 | | .003 | .002 | .057 | .004 | .000 |
| Roads | .000 | .116 | .001 | .000 | .003 | | .000 | .003 | .221 | .000 |
| Vehicles | .000 | .150 | .002 | .000 | .002 | .000 | | .003 | .157 | .000 |
| PostOff | .006 | .108 | .022 | .022 | .057 | .003 | .003 | | .154 | .036 |
| TPLines | .122 | .185 | .313 | .384 | .004 | .221 | .157 | .154 | | .021 |
| ElecGen | .000 | .413 | .049 | .002 | .000 | .000 | .000 | .036 | .021 | |

Following these results, the log values were calculated and put in the regression analysis to figure out the variables that positively impact the dependent variable of GDP. The following tables sum up the results.

**Table 7**

**Model Summary (c)**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sif. F Change | |
| 1 | .993a | .987 | .986 | .03536 | .987 | 1121.774 | 1 | 15 | .000 | 1.467 |
| 2 | .997b | .993 | .992 | .02650 | .006 | 12.697 | 1 | 14 | .003 | |

a. Predictors: (Constant), Roads

b. Predictors: (Constant), Roads, Vehicles

c. Dependent Variable: GDP

**Table 8**

**Coefficients (a)**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | -6.809 | .343 | | -19.880 | .000 |
| | Roads | 2.674 | .080 | .993 | 33.493 | .000 |
| 2 | (Constant) | -5.302 | .495 | | -10.716 | .000 |
| | Roads | 1.348 | .377 | .501 | 3.575 | .003 |
| | Vehicles | .721 | .202 | .499 | 3.563 | .003 |

a. Dependent Variable: GDP

Log values of the variables are used in the above regression. A stepwise method is carried out as the independent variables are multiple. The regression extracts two variables that show a positive impact on economic growth. The R Square values in the model summary are very significant. The coefficient results show that a percentage increase in roads will lead to a 1.348 increase in the GDP. Similarly, a percentage increase in vehicles will lead to a 0.721 increase in GDP. The results are therefore positive for these two infrastructure variables. The following table gives a descriptive analysis of the variables.

**Table 9**

**Descriptive Statistics**

| | Med.Ins | Roads | Vehicles | PostOff | TPLines | ElecGen | CapEx | EduEnroll | workforce | GDP |
|---|---|---|---|---|---|---|---|---|---|---|
| N Valid | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 |
| Missing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mean | 114.0000 | 20036.4171 | 701645.0000 | 1689.4706 | 254233.0000 | 669.2881 | 383546.6835 | 9.9124 | 40.3847 | 56498.8571 |
| Median | 114.0000 | 18961.0000 | 621057.0000 | 1692.0000 | 249903.0000 | 504.4400 | 300187.6900 | 10.0700 | 40.3800 | 42314.8500 |
| Std. Deviation | 5.67891 | 5136.12390 | 33223 2.1220 | 14.35757 | 68702.49652 | 268.02277 | 334281.1792 | 2.02478 | 2.84500 | 36977.56811 |
| Skewness | -.072 | .357 | .688 | -2.778 | .215 | .1671 | 1.101 | -.241 | .000 | .673 |
| Kurtosis | -1.063 | -1.448 | -640 | 9.383 | -1.245 | 2.525 | 1.220 | -1.181 | -2.200 | -1.020 |

Med.Ins: Number of Medical Ins | PostOff: Number of PostOffices | CapEx: In Lakhs (Hundred Thousands)

Roads: Kilometre Square | TP Lines: Number of connections | EduEnroll: In Lakhs (Hundred Thousands)

Vehicles: Number of Vehicles | ElecGen: MegaWatts | WorkingForce: In Lakhs (Hundred Thousands)

## Conclusion and Policy Recommendations:

Kashmir is a landlocked region so it makes sense theoretically as well that if there are improvements in road connectivity and vehicles, it will substantially increase the amount of trade happening in the region; many more goods and services will flow in and out. It is also recognized in the literature about how transportation infrastructure is essentially important for landlocked

developing countries for integration[32]. Kashmir is a region well known for its touristic attraction, therefore, a better road and transportation infrastructure can also substantially increase the number of tourists coming in and therefore contributing positively to the GDP. It explains why the analysis is showing these variables as the most significant. It can also be recommended based on this evidence that a higher degree of investment must flow to these sectors of infrastructure to have a highly positive impact on growth in the Kashmir Economy. There are some variables in the regression that can have a lagged effect on the GDP. For example, education can be one of them. The positive impact of education cannot be seen in the short term but takes time to work towards producing a positive outcome. Due to the lack of appropriate data to work on the long-run impacts of the variables, the results are limited to the short-run impact. But generally, the results prove that there is a correlation between infrastructure factors and economic growth. And it also proves that some infrastructure variables impact the growth positively at least in the short run. Subsequently, we can spell out two important policy implications from the above discussion.

1) An efficient and continuous data collection process must be undertaken so that more comprehensive empirical studies can be carried out in the future.
2) Investments should flow towards Roads and Vehicle infrastructure to enhance growth in the economy.

**A Policy Framework for Investment Decision on Infrastructure:**

As discussed earlier the need for establishing a framework for Investments on Infrastructure stems from the following pertinent question posed by William Ascher and Corinne Krupp. *Under what circumstances does infrastructure expansion make sense?*[33] It is recognized that a positive relationship proved between infrastructure and growth might not be an all-encompassing reason to carry out the investment. It is important to scrutinize it considering the *ends* it would arrive at.[34] Infrastructure is not an end in itself but a means to arrive at human well-being and economic prosperity at large. Secondly, it is also important, given the particular context of a region to figure

[32] Morgan G, Ceppi P, Crosskey S, & O'Regan N. The Importance of Infrastructure For Landlocked Developed Countries. UNOPS, Copenhagen, Denmark., pg 1.
[33] William Ashcer and Corinne Krupp (2010). Physical Infrastructure Development: Balancing the Growth, Equity, and Environmental Imperitives. Pacific Basin research Center, Soka University of America., pg 3
[34] Brett M. Frischmann (2012). *Infrastructure: The Social Value Of Shared Resources.* Oxford University Press., pg 64

out how carrying out the implementation in that region would make economic sense. The percentage of funding to be allocated considering the other requirements of the economy, and a plethora of different considerations. This study recognizes that governments make a certain level of evaluation and various studies have also discussed these problems. But this study points out the lack of a proper framework that could be followed by governments before making policy decisions. Subsequently, a general outline for the framework is constructed here. It can be helpful for any government to consider as a litmus test for arriving at a decision. A form of systemization like that of the clinical economics approach[35] introduced by the economist Jerry Sachs is utilized. It approaches the idea of arriving at an economic policy similar to that in the medical profession. A wide variety of factors are scrutinized before prescribing a treatment appropriate for an individual patient. Economies are like individuals, they have particular challenges, struggles, nature, and goals. A universal prescription does not work on all individuals, doctors need to specifically study the particular patient for arriving at a treatment that would work for them. Similarly, universal prescriptions do not necessarily work on all individual economies. A specific study and scrutiny are often a requirement. When it comes to infrastructure, a similar pattern of taxonomy can be developed for arriving at an appropriate investment decision. Though it is proven empirically at a general level that infrastructure serves economic growth positively, the following three knots need to be knit for a region-based decision.

1) Region-Based empirical research establishing a relationship between infrastructure and economic growth. The inclusion of factors like human capital and other non-tangible factors can be a challenge. Effective data collection must be maintained throughout.
2) If the results are positive and substantial, a clinical study must be made on the fact whether the investment will make sense considering the current position and challenges in the economy.
3) At the same time, using a clinical approach it needs to be figured out how best the decision can be implemented in that region if investing makes sense. For example, whether it should the public or private sector that should undertake the project or similar concerns that deal with effective implementations.

The taxonomy of the framework is divided into the following:

[35] Jeffrey D. Sachs (2005). *The End of Poverty: Economic Possibilities for our Time.*

1) Political
2) Social
3) Economical, and
4) Psychological

Any policy that is to be implemented must be viewed through the lens of the factors mentioned above before a final decision is taken. It will create a holistic understanding concerning the investment and whether the investment is making sense at a comprehensive level of that particular region.

- **Political:** The question of the political reality of a region relates to two important dimensions. The first is the current political atmosphere in the region and the second relates to the nature and form of political institutions. The question that the political atmosphere imbibes in itself is about stability. Is there political stability in the region? If a region is living through a war-like situation, is on a verge of war, or is going through a cycle of violent conflicts, the sense of making an infrastructural investment there would usually not make sense. The governments will be in more urgent need to focus their fundings towards efforts of self-defense or curbing violent conflicts. At the same time, wars and conflicts lead to the destruction of the infrastructure itself. Whereas in certain forms of conflicts it would be recommended to spend more on things like infrastructure. Some regions might be going through a cycle of *conflict trap*[36] due to a lack of economic growth and development. In those regions, it would be recommended to intensify the investments such as in the sector of infrastructure that would lead to an increase in economic growth and quality of life of the people. So a study of the reasons and kinds of conflict existing in a region is also an important inquiry while concluding whether the political atmosphere of that region is suitable for the infrastructural investments. If the infrastructural investment seems to be making sense considering the first dimension of the political reality of the place, the second dimension that relates to the nature of the political institutions needs to be studied. There are many countries where political institutions are not efficient. The constant failure on the part of the state to provide efficient utilization and creation of infrastructure can be an indicator of a need of taking a new path. If there is a lot of fraud and corruption in the

[36] Havrd Hegre, Havard Mokleiv Nygard, Havrad Srand, Scott Gates, and Ranveig D. Flaten (2011). *The Conflict Trap.*

bureaucratic system, it again is an indicator. If the record of the political mechanism in the state is bleak and inefficient, then a form of PPP (public-private partnership) that would assure more efficiency and less corruption must be sought after. It might be more expensive for the government to pay private companies to carry out the project, but the results can be much more efficient, and sensible considering all the money that gets soaked into the system of corruption. Private companies can be held accountable directly to the government, and are in a market of competition. The governments that lack funding might seek different forms of PPP considering their fiscal situations. For example, private companies funding an infrastructure project itself, and therefore owning and maintaining it either on some temporary bases of the lease with the government or on the permanent bases. Here, the governments have to consider the ends of such a PPP because if those projects were made to benefit the poor sections of the society, then it might not reach the desired results. For example, private companies usually take high toll taxes on the highways and bridges they own, therefore it substantially alienates a section of society that cannot afford using it. So, this second dimension of the political reality of the regions relates to the mode of implementation chosen for a policy. If the Public institutions have deep problems of inefficiency and fraud, a private body for implementation has to be recommended unless the public institutions are enhanced.

- **Social:** In the social reality of a region we can lump all the factors like poverty, health, environment, inequality, crimes, and climate into the group. Subsequently, we can mention that if the region is deeply engulfed in problems at a high level in any of these factors, it must be a priority in their investment allocations and policy implementations. The region must have to study how implementing the infrastructural investment might impact these factors playing out in society. So for example, if the level of poverty in that region is immense, and there is a rampant disease outbreak, or the region is on some environmental threat, allocating high amounts of funding on infrastructure without efforts on directly dealing with the problem of the poverty, disease outbreak, or environment will hardly make any sense. Certain regions are located in the places that can be prone to floods, earthquakes, or any similar natural disasters, and spending on infrastructure that doesn't relate to them might not make sense without first building infrastructure that makes them resilient against them. And also, how an infrastructure project interacts with the factors pointed out above

has to be scrutinized. So for example, the creation of a highway without taking care of the people who are displaced or impacted by it would not make a societal sense. The displaced people in these regions are mostly poor, and even if they are not poor, the most hit by such an action are poor people. Infrastructural projects also have a capacity of leading to deeper inequalities if the poor sections are not helped in gaining access to it. A higher electricity generation doesn't make sense for a poor household that cannot afford it. A new highway connecting two places with toll taxes that the poor cannot afford doesn't make sense for them. Only the better-off sections of the society can gain for them and therefore, make progress. Factories can produce more with better accessibility of electricity, but a poor home cannot still lit the light in the night to spend some extra hours studying or weaving a sweater for their few customers. The point of all the discussion is that, for infrastructural investment to make sense they must go through the scrutiny of the factors pointed out above. The overall sense here is that a study of how the infrastructure project will interact with the societal reality needs to be understood before a decision is taken.

- **Economical:** The economic reality of a region relates to its current fiscal conditions. An infrastructure project might be making complete sense for the region but the fiscal and macroeconomic situations might not be suitable. The most important question that this reality deals with is what mode of financing to adopt. It won't be a great idea for a country with already mounting fiscal deficits to take more loans. There are different ways of financing that have been recognized. A region depending on its current economical reality might want to choose one that suits them best for its purpose. Willian Ascher and Krupp point out the following modes:

1) *General Obligation Bonds*
2) *Revenue Bonds*
3) *Direct expenditures from the nation's central budget that do not entail borrowing; an increase in such financing can be funded either by*
    a) *raising taxes*
    b) *diverting funds from other purposes,*
    c) *using grants from donors.*
4) *Loans from domestic and/or international sources*

5) *Public-Private Partnership arrangements*
6) *Infrastructure development trusts funded through fees or taxes (e.g., fuel taxes).*[37]

- **Psychological:** How an infrastructural project will interact with psychological reality can also be considered under this category. Some regions have deep inequalities and limitations due to class, caste, religion, ethnicity, and gender relations. Governments also need to make continuous efforts in increasing education and exchange between these differences so that such mirages of hatred or discrimination/subjugations in the society are lifted. An infrastructural project might not lead to many benefits if the people of that region hamper others based on caste, religion, gender, or ethnicity to utilize its benefit. Governments have to make constant efforts that the access to new infrastructures are not hijacked by some on the cost of others. Women, for example, need to be given an equal opportunity to seek education, health, work, and recreation. An infrastructure that joins two communicates that have developed hatred can be used both in a positive or negative direction. It can either lead to more communication and exchange that reduces their differences or can lead to riots if things are not properly maintained by the government. These are great challenges in some regions of the world. For example in India, the induced hierarchy and divisions based on all lines of caste, religion, gender, and ethnicity play a very vibrant role in society. Infrastructural projects must be carried out in such a way that the benefit reaches all, and that certain sections don't hijack it on the cost of others. The psychological message and environment that infrastructures might create are also important. If the government takes away the lands and ends up displacing only one segment over the others, it might induce a sense of dissatisfaction and marginalization in society.

If an infrastructural policy is reached through the framework given above, it will give the policymakers a good idea at a comprehensive level if the decision makes sense in that region. The decision might not always be perfect considering all the considerations, but when the harm is deep, and opportunity costs higher, it's better to let go of the investment even if empirically it shows a

[37] William Ashcer and Corinne Krupp (2010). Physical Infrastructure Development: Balancing the Growth, Equity, and Environmental Imperitives. Pacific Basin research Center, Soka University of America., pg 43.

positive relationship with growth. At the same time, the above framework can help formulate the implementation mechanism for the policy. For example, the questions that deal with modes of financing, or public-private partnerships when the public institutions are inefficient can be dwelled in.

**Infrastructure Investment in Kashmir Economy**

We can apply the framework arrived at above on the region of Kashmir. Given the results arrived at from the available data, the policy implication can be thought of in the following manner following the framework.

1) **Political**: The political atmosphere in Kashmir is known to be unstable. There have been constant skirmishes between the state forces and the people. The region is internationally recognized as a disputed territory. Although, the nature of the conflict is different from what might be classified as conflicts imbibing war-like situations, or conflicts that behold unprecedented violence and destruction of property. There indeed needs to be enough effort in the region to arrive at some dispute resolution so that the cycle of conflict and oppression is broken. But at the same time, economic strengthing of the region would help the region to be stronger in its resolve, reduce the existing violence, and make the region economically strong to demand independent resolutions and therefore not remain vulnerable. It's also known in the conflict literature how a weak economy can entrap a region into the cycle of conflict resurfacing time and again. Considering the nature of conflict in Kashmir, it makes sense to move forward in all sorts of policies that would enhance economic strength, reduce poverty, and increase the per capita income of the region. The empirical results shown earlier show a positive relationship between investments in roads and vehicles with the economic growth in the region. The political atmosphere doesn't stand an obstacle in carrying out the investment in the region. The political institutions in the region stand a massive obstacle. The inefficiency and corruption in the bureaucratic system are rampant. Infrastructural projects take unnecessarily long periods to be built, and due to the corruption a lot of funding is suck up resulting in an outcome that is inefficient and lacks quality. Given this current situation of the public institutions, a public-private partnership must be recommended. A private company competing in the market, and that would stand

accountable directly to the government might be a better deal to approach the infrastructural investment.

2) **Social**: The rate of poverty in Kashmir was recorded to be 10.35%[38] that is below the national average of 21.92% in India. The range of other factors of health, crime, employment, inequality are also matters of concern but depict nominal rates. The climate of Kashmir is susceptible to occasional floods and earthquakes. The need for government policies dealing with all these other factors directly, and also at the same time on infrastructural development, therefore, depicts a balancing picture. Infrastructural development also can positively impact these factors, though that is not an established necessary outcome in all cases as discussed earlier. It turns out transportation is highly relevant to growth in Kashmir's economy. Roads and better means of transportations tantamount to more mobility and access to opportunities of commerce, work, and education. Commerce is a very determining factor especially in a landlocked region where roads are the only means of connectivity. Congestion of roads is another problem. It is an excess of demand over the supply. It leads to delays for the other users of the given resource. The inefficiency and waste of time resulting from traffic jams and congestion are one of the major problems also in cities like Srinagar in Kashmir. It is also important in this region to actively look into the externalities of the projects to be taken. If a highway construction project leads to displacement or disadvantage of the people living in the surrounding, they must be duly and fairly compensated, or provided new placements before the project is undertaken. It needs to be also be made sure that these new projects become accessible to people. And any natural disaster risks are first mitigated.

3) **Economical**: The government also needs to figure out the best mode of financing for the infrastructure. Kashmir's economy is under the de facto administration of the Indian State. Therefore, the funding for such projects comes from the state revenues as well as the funds coming from the center. As of 2017, there was an upward trend in the revenue receipts and public accounts receipts[39]. After the new downturn of the economy since the eruption of conflict and closure of a lot of economic activity since 5$^{th}$ August 2019, there is a need to have a comprehensive overview of the current fiscal situation of the state. If state plans to

[38] The Annual Report of the Reserve Bank of India, 2013
[39] The Economic Survey, 2017 (Government of Jammu and Kashmir)

take up any new infrastructural projects, they need to gauge the current fiscal situation of the region accordingly.

4) **Psychological:** The psychological reality existing in the Kashmir region is much linked to the experiences of conflict people are facing. The day by day sense of alienation they have with India is increasing. But within the region itself, though it won't be fair to say that there are no divisions or inequality, but they are less. Despite that, governments need to see how any of the infrastructural investments will play out on lines of divisions that exist in society. It's the job of the government to make sure that the projects are of the benefit to all and not just to certain segments of the society. And also, to make sure, as discussed earlier, that they not become hijacked by some groups on the cost of others.

# Concluding Remarks

This study was based on two basic foundations. The first was the hypothesis that Infrastructure has a positive impact on growth in the economy of developing countries and in particular the economy of Kashmir. With the help of the overview of the existing literature as was shown in the study, it can be safely asserted that the hypothesis is proven in most developing countries. As for the economy of Kashmir, an empirical study was carried out using the currently available data. It was found that infrastructure variables were correlated with growth, and also some of the infrastructure variables showed a clear and positive impact on the growth. Subsequently, the hypothesis stands accepted. The second basic foundation of the study was to construct a policy implication framework. The taxonomy providing a framework was constructed and also an example of its application on the Kashmir economy was attempted. It is important to note here that the two important policy implications that followed the empirical study on Kashmir included a focus on an efficient and consistent collection of data on the Kashmir economy as the data was found out to be limited. It follows from this that a much better and holistic policy application exercise can only be carried out when a comprehensive dataset is available. The second policy recommendation related to the finding that roads and vehicles, in other words, the transportation infrastructure is highly related to growth in the economy of Kashmir. The study also dwells into discussions on the definition and scope of the understanding of Infrastructure. The scope of infrastructure to extend beyond our common understanding of the physical assets was expounded. The contribution of this study is based on the lack of two basic foundations mentioned earlier. A lack of any study on the relationship between infrastructure and growth in the Kashmir's economy. And a general lack in the literature of a framework that could be used as a litmus test for policy implications. This study recommends that in Kashmir, efforts from governments or organizations be initiated for greater data collection from all the possible records of different sectors in the region. And also a methodology for a continuous process and collection be maintained. And secondly, on an academic level, more studies focus on formulating a framework based on the basic framework provided in this study.

# References


Aschauer, D.A (1990). Why is Infrastructure Important? *Conference proceedings, Conference series no. 34,* Federal Reserve Bank of Boston, pages 21-68.

World Bank (1994). Infrastructure for Development, *World Development Report 1994.* Published for Washington D.C. World Bank by Oxford University Press, New York.

William Ashcer and Corinne Krupp (2010). *Physical Infrastructure Development: Balancing the Growth, Equity, and Environmental Imperatives.* Pacific Basin Research Center, Soka University of America.

Aschauer, D.A (1989). Is Public Expenditure Productive? *Journal of Monetary Economics, Volume 23, Issue 2,* Pages 177-200.

Canning, David and Pedroni, Peterv (2004). The Effect of Infrastructure on Long Run Economic Growth. *Department of Economics Working papers 2004-04,* Department of Economics, Williams College.

Jeffrey D. Sachs (2005). *The End of Poverty: Economic Possibilities for our Time,* The Penguin Press, New York.

Baldwin J.R., & Dixon, J. (2008). Infrastructure Capital: What is It? Where is It? How Much of It is There? *Research Paper Research Paper Series (16).*

Brett M. Frischmann (2012). *Infrastructure: The Social Value of Shared Resources.* Oxford University Press.

Ismail, N.W., and J.M. Mahyideen. 2015. The Impact of Infrastructure on Trade and Economic Growth in Selected Economies in Asia. *ADBI Working Paper 553.* Tokyo: Asian Development Bank.

K.V. Kamath. *Journal of Infrastructure, Policy and Development (2017) Volume 1, Issue 2.*

Derya Yilmaz and Isin Cetin (2018). The Impact of Infrastructure on Growth in Developing Countries: Dynamic Panel Data Analysis. *Research Gate Publications,* Uludag University.

Lous Y. Pouliquen (2000). Infrastructure and Poverty, *Internal Documents,* World Bank.

IMF (2019). *World Economic Outlook*, October Edition.

Sahoo, P and Dash, R.K. (2009). Infrastructure Development and Economic Growth in India. *Journal of the Asia Pacific Economy, 14(4).*

Aswini Kumar, Kunapareddy, Bibhu Prasad (2013). Growth and Infrastructure Investment in India: Achievements, Challenges, Opportunities. *Economic Annals, Volume LVIII, NO. 196/2013*

Morgan G, Ceppi P, Crosskey S, & O'Regan N. *The Importance of Infrastructure For Landlocked Developing Countries.* UNOPS, Copenhagen, Denmark., pg 1.

Havrd Hegre, Havard Mokleiv Nygard, Havrad Srand, Scott Gates, and Ranveig D. Flaten (2011). *The Conflict Trap.*

Salma Munir, Ijaz Elahi, Irfan Hussain Khan (2018). Impact of Human Capital and Infrastructure Development on Economic Growth in Pakistan. *European Online Journal of Natural and Social Sciences 2018; Vol. 7, No 3(s).*

Khan (2005). Human Capital and Economic Growth in Pakistan, *The Pakistan Development Review*, pp. 455-478.

Mishra, Narendra and Kar (2013). Growth and Infrastructure Investment in India: Achievements, Challenges and Opportunities, *Economic Annals.*

Jesus and Seren (2001). Human Capital accumulation and economic growth, *investigation economics, volume. 25 (3), Pages 585-602.*

Bils, M. and Peter, J.K. (2000). Does Schooling cause Growth? *American Economic Review 90 (5),* pages 1160-1183.

Economic Surveys, various years. *Government of Jammu and Kashmir. http://ecostatjk.nic.in/*

Digest of Statistics, various years. *Government of Jammu and Kashmir. http://ecostatjk.nic.in/*

B. Srinivasu and P. Srinivasu Rao (2013). Infrastructure Development and Economic Growth: Prospects and Perspective. *Journal of Business Management & Social Sciences Research, Volume 2, No.1.*

John Cockburn, Yazid Dissou, Jean-Yves Duclos, Luca Tiberti (2013). *Infrastructure and Economic Growth in Asia.*

Daniel Gurara, Vladimir Klyuev, Nkunde Mwase and Andrea F. Presbitero (2018). Trends and Challenges in Infrastructure Investment in Developing Countries. *International Development Policy [Online*].

Sahoo, P., Dash R.K., & Nataraj G (2010). Infrastructure development and Economic Growth in China. *IDE Discussion Paper No. 261.*

*(2019) India Industry Report*, December Edition.