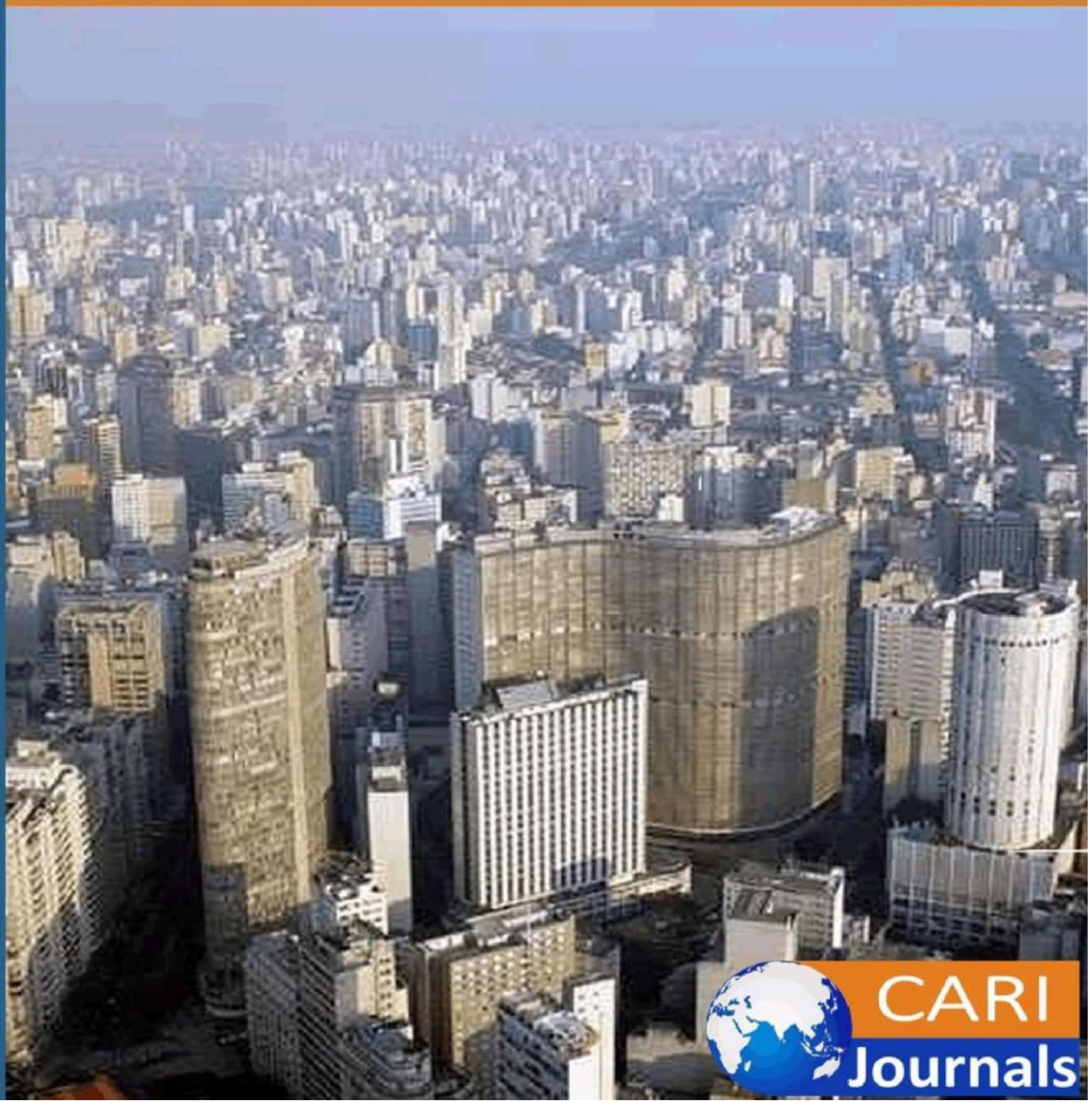
International Journal of
Poverty, Investment and Development
(IJPID)

# Infrastructure Development and Economic Growth in South Sudan



CARI Journals

International Journal of Poverty, Investment and Development
ISSN 2958-2458 (Online)
Vol. 5, Issue No. 1, pp. 1 - 18, 2025
www.carijournals

# Infrastructure Development and Economic Growth in South Sudan

**Dr Paul Gal Atem PhD**
Assistant Professor, School of Public Service, University of Juba
https://orcid.org/0009-0006-0171-2634

***Accepted: 26th Dec 2024 Received in Revised Form: 26th Jan 2024 Published: 23rd Feb 2025***

## Abstract

**Purpose:** The purpose of this study was to examine the infrastructure development and its contribution to the economic growth of South Sudan with emphasis on transport, communication and electricity. The dependent variable was economic growth, measured by the growth rate of gross domestic product, and the independent variables to measure infrastructure were road transportation, communication, and electricity.

**Methodology:** Qualitative methodology was used through face to face interviews using an interview guide and focused group discussions from a sample of 200 respondents comprising of the directors from the Ministry of Infrastructure, Ministry of Finance, Members of parliament and local government as the representative of the common citizens selected using stratified sampling technique. The data collected was analyzed descriptively into themes and interpreted.

**Findings:** The findings revealed that infrastructure played a significant role in the economic growth of the country. Road Transportation, communication, and electricity had a positive impact in development of the country. However the absence of economic resilience and the inability need to fill the technology gap and insufficient production of basic needs contributed to inequality and states' disparities.

**Unique Contribution to theory, Practice and Policy:** The study findings were aligned to the theory of infrastructure-led development, which states that public capital, in which infrastructure is included as necessary input in the production process, contributes to economic growth. The study recommended that South Sudan should adopt strategies and policies that will increase the quantity and quality of infrastructure development, as well as a capital formation strategy accompanied by human capital development and high institutional quality.

***Key words:*** *Infrastructure development, Infrastructure investment, Economic development, Theory of infrastructure- led development*

## Introduction

The development of a country's infrastructure is important to the growth of its sectors and the overall economy. The infrastructure sector primarily comprises of electricity, roads, telecommunications, railways, airports, water supply and sanitation and oil and gas pipelines. Developing and maintaining reliable, sustainable, affordable and climate resilient infrastructure in both rural and urban areas has been identified as being critical for driving social, cultural and economic development, (Calderon & Chong (2010). Infrastructure therefore, is one of the fundamental drivers for socio-economic transformation of the country over medium terms. A number of countries have significantly improved their basic infrastructure endowments in the recent past, and this appears to correlate significantly with good growth performances. Infrastructure provides people with services they need and want for example water and sanitation; power for heat, cooking, and light; telephone and computer access; and transport. The absence of some of the most basic infrastructure services is what is referred to as high level poverty. Increasing level of infrastructure stock, therefore, has direct implication for poverty reduction, (Ansar et al, (2016). However, there are many ways infrastructure shortcomings translate into productivity efficiency losses. For example, access to markets and interactions with potential clients rely on the existence and reliability of transport and telecommunication networks, and when these fail, firms may suffer from lack of access to market opportunities, higher logistic costs and inventory levels, or information losses. Similarly, investment and technological choices may be affected by the efficiency of electricity networks, in the sense that frequent power outages and unstable voltage induce high costs and greater risk of machinery breakdown, (Arezki et al, 2017). Growing evidence shows that firms respond by making suboptimal technological choices, by investing in remedial equipment such as power generators, a case of South Sudan in point. This paper therefore, presents infrastructure development in South Sudan with main focus on reliable national transport network, energy, telecommunication, quality of buildings and water for production in South Sudan.

## Background of the study

The new Republic of South Sudan (RSS) is classified as a post-conflict country. South Sudan is characterized by a very high degree of socio-economic fragility, with weak institutional and human capacities and one of the lowest social development indicators in Africa. The political, security, economic and social situations have remained fragile. The country has also a narrow economic base, with a heavy dependence on the oil sector. In this context, the dilapidated infrastructure development, mainly as a result of decades of war, has been identified as the most binding constraint for economic diversification and inclusive private sector-led growth and productive employment. Infrastructure development could address the most pressing challenge of South Sudan, namely the urgent need for peace and state building, including accommodating the high expectations of the population for peace dividend through job creation and improved livelihoods

The demand for infrastructure in South Sudan is increasing and expected to soar further because of increasing urbanization. Due to conflict in the rural areas, majority of the citizens have moved to urban centres for security and hence exerting pressure on the limited infrastructure for efficient services. As economies grow rapidly and urbanization advances, however, the demand for more and high quality infrastructure is expected to further accelerate. At independence in 2011, there was no tarmac road in south Sudan. The first tarmac was constructed from Juba to Nimule by the US government/World bank to ease access and supplies to the land locked country of South Sudan. Currently many other infrastructure developments have been initiated. For example, the tarmac road from Juba to Bor in Jonglei state, the tarmac road from Juba to Rumbek and further developments of small feeder roads in Juba City have witnessed improved security within the city.

According to the IMF (2017), there were wide gaps in infrastructure development in all dimensions. For example, access to electricity and access to transportation were 43% and 24% in low-income countries, respectively, whereas 32% and 18% in middle-income countries (IMF, 2017). Furthermore, investigation by the World Bank (2017) indicated that there were large gaps in electricity, water and transportation infrastructures and concluded that such gaps were actual constraint on economic activity. While the world's population growth is most rapid in certain regions, the recently recognised free trade agreement and infrastructure development could serve as a foundation for Africa's economic transformation. Increasing and improving infrastructure quality can be used as a catalyst for growth in motivating the local industries to scale up and attract the attention of investors to the region (IEA, 2019).

**Statement of the problem**

Peace and stability according to Deng (2013) remain key prerequisites to addressing vigorously the infrastructure bottlenecks. It takes the position that infrastructure development in South Sudan will primarily require sustained and concerted efforts in addressing medium to long term structural, human and institutional factors, including devising appropriate financing arrangements. As long as these factors are not adequately dealt with, they will remain valid and persist over time. Road density in South Sudan is among the lowest in Africa and connections with neighbors are limited, especially in the north. Connectivity to Sudan is via river or air. On the limited roads, most traffic is between Juba and Uganda, which links South Sudan with the rest of East Africa. Elsewhere on the network, traffic is sparse and road conditions are patchy at best. The distant port at Mombasa, Kenya, provides connectivity to the sea. Similar to the other infrastructure sectors, the power generation and transmission networks are in an embryonic state (IMF 2017). There is only a very small distribution network in Juba; in the rest of the country, power networks are nonexistent and power provision is limited to small-scale thermal generation. The country is naturally endowed with water, as the Nile feeds large irrigated areas. But even though, over 50 percent of the land is suitable for cultivation, less than 4 percent of the total land is currently cultivated, and agricultural production is primarily for subsistence (IMF, 2017). The ICT market is still underdeveloped: even

the semblance of an ICT backbone has not yet been put in place. The country would do well to take advantage of Sudan's and Uganda's connections to a submarine cable hence, significant improvements are needed to improve South Sudan's connectivity. South Sudan's road sector institutions have serious limitations that hinder their ability to effectively and efficiently implement major road programs. The country lacks the required policy and institutional framework. Key constraints hindering the implementation of road works include: inadequate implementation capacity; lack of capacity to manage, maintain, and operate existing and new infrastructure; and inability to apply internationally recognized safety and security standards. This paper therefore intends to address the challenges, constraints and provide suggestions for infrastructure development in South Sudan for economic growth.

**Research Questions**

The research attempts to answer the following research questions.

1. Which infrastructure sector development has greater impact on economic growth?

2. Does political and foreign influence have effect on infrastructure development?

3. What is the nature of relationship between infrastructure developments and economic growth?

4. What challenges of infrastructure development affect economic growth?

**Objectives**

The general objective of this study was to examine the relationship between infrastructure development and in particular road transport, telecommunication, electricity and the economic growth of South Sudan.

**Related Literature review**

Infrastructure investment is a key component of the 2030 Development Agenda of most developing countries including South Sudan. However, the interest around infrastructure is not new. Since the 1990s there has been a wide body of literature looking at the possible development gains from investing in infrastructure (World Bank 1994). The macro literature showed that improvements in infrastructure raised productivity, stimulated private investment (Cavallo and Duade 2011), and facilitated domestic and international trade (Bougheas et al. 1999), thereby promoting sustainable growth (Esfahani and Ramirez 2003; Agenor 2010; Calderon and Serven 2010). Focusing on transportation investments in Africa since 1960, Jedwab and Storeygard (2016) showed that increased market access had a positive effect on city growth, favoring urbanization.

Access to quality and reliable infrastructure for instance roads, transport, electricity and information and communications technology (ICT) is vital for boosting industrial activities that in the end, leads to better standards of living through employment creation and economic growth

(United Nations Industrial Development Organization, 2016). Infrastructure development speeds-up the process of economic development by encouraging more production and results in lower cost of participating in domestic and international trade. Increased infrastructure services results in industrialization and more employment opportunities are generated, resulting in low-poverty levels in a country (Sahoo et al., 2010). Infrastructure is very important towards attainment of SDGs through accelerated growth and improved welfare of the population. For example, Medeiros et al. (2020) found that infrastructure development has a positive impact on poverty reduction among households in Brazil. Similar results were obtained for Mexico in a study by Mora-Rivera and Garcia-Mora (2021). However, in comparison to other regions globally, the level of infrastructure development in Africa still ranks behind even though infrastructure drives many activities in any economy. Africa still faces the challenges ranging from poor accessibility to quality infrastructure and high cost of service provision (Jerome, 2011).

The analysis of railroads in Ghana and Kenya showed that infrastructure investment could produce long-term economic gains by reducing trade costs and integrating markets, potentially transforming the economic landscape in poor, remote regions with high trade costs (Jedwab and Moradi 2016; Jedwab etal. 2017). Similar findings have been shown for colonial India, where railroads decreased trade costs and interregional price gaps and increased interregional and international trade as well as real income level (Donaldson 2017). The historical impact of railroads on the American economy is also consistent with a positive impact of infrastructure investment on market integration and economic development (Donaldson and Hornbeck 2016).

Increased access to essential services could reduce inequality, foster inclusion and support poverty reduction efforts (Calderon and Chong 2004; Calderon and Serven 2010). Micro-level evidence shows that the distributional effect of infrastructure investment could vary. For instance, Khandker et al. (2009) looked at road improvement projects in Bangladesh and found overall positive effects on output and poverty reduction; they also showed that the poorest households are those benefiting the most. Similarly, Jedwab and Storeygard (2016) pointed to the importance of taking the local context into consideration, given the evidence of heterogeneous effects of transportation investments in Africa, which seem to favor small and remote cities. The evaluation of programs of infrastructure rehabilitation in Georgia and Vietnam also showed positive average effects, with some evidence of a stronger effect on the poor (Lokshin and Yemtsov 2005; Mu and van de Walle 2011). Duflo and Pande (2007) looked at large public infrastructure investments specifically, dams in India and found a bleaker picture as poverty, in the aggregate, rises. Moreover, they pointed out significant distributional implications, as agricultural productivity increased in downstream districts but not in those where dams were built, where poverty increased. Similarly, the extensive highway network built in China since the 1990s has complicated spatial effect on economic activity, with winners and losers. Large cities in the center of a dense regional highway network grow faster and specialize in business services and manufacturing, while the hinterlands grow more slowly, and become relatively more specialized in agriculture (Baum-Snow et al. 2017). This

points to the importance of anticipating distributional effects of infrastructure projects and planning offsetting measures if such effects are expected to be negative.

Lack of infrastructure continues to be a key obstacle to growth and development in many low-income countries and worse for South Sudan which has been embroiled in conflicts since independence. In Sub-Saharan Africa in particular, only 16 percent of roads are paved, and less than one in five Africans has access to electricity. (Agenor 2010) Transport costs are the highest in the world and act as a significant constraint on trade expansion. Yoshino (2008) for instance found that poor quality of public infrastructure measured in terms of the average numbers of days per year for which firms experience disruptions in electricity had an adverse effect on exports in sub-Saharan Africa. In Rwanda, for example, farmers receive only 20 percent of the price of their coffee as it is loaded onto ships in Mombasa; the other 80 percent disappear into the costs of poor roads as well as red tape between Rwanda and Kenya. In South Sudan, it takes days to move from one state to the other due to very pathetic road infrastructure constraining agricultural production, trade and movement of people.

Even though the empirical literature indicates that infrastructure investment could deliver long-term gains, some historical experiences suggest caution. For example, in the 1980s, a wave of public-financed infrastructure investment delivered poor results in terms of short and long-run economic growth, mostly because of cost overruns, corruption and poor maintenance (Arezki et al. 2017; Warner 2014). After this negative experience, and following market liberalization policies, the private sector started playing a more prominent role in financing infrastructure investment. However, in many developing countries this resulted in high construction and maintenance costs (Estache and Fay 2007). Thus, public investment effectiveness and efficiency are not always assured and need to be achieved through appropriate institutions and policies.

Infrastructure is not only necessary for economic activities made by the government but also for the economy's private sector. At the same time, households and businesses can be facilitated by infrastructure (Stupak, 2017). Infrastructure accumulates capital stock and, as a result, will directly impact productivity. Labor productivity can be increased by improving telecommunication, technology, education, and health facilities. Pradhan et al. (2014) studied the fact that the advancement of infrastructure causes economic expansion and that the source can be unidirectional. The long-term effect on economic development of private investment and national infrastructure investment was favorable and vital. Communication infrastructure significantly impacted Pakistan's economic prosperity and the same could be applied to South Sudan. Olaseni and Alade (2012) explained that infrastructure was strongly linked to economic growth.

**Macroeconomics**

The physical indicators of infrastructure have progressively replaced monetary measures of public infrastructure capital investment as the main proxies used in the empirical evidence. The growing share of private investment in infrastructure and the large measurement and reliability problems

of public capital indicators were probably instrumental in favoring the emergence of physical indicators databases, such as the one initially developed by Canning (1998), which tracks country-level kilometers of road and railroads, number of phone lines, and electricity generating capacity. Seethepalli et al. (2008) in East Asia found a positive effect of all dimensions of infrastructure stocks on growth, using standard growth regressions in a panel of 16 East Asian countries at 5-year intervals. They also concluded that these significant effects vary with a number of country-level characteristics. For example telecom and sanitation were found to have a greater effect in countries with better governance, higher income level, and low inequality in the access to infrastructure. In contrast, Straub et al. (2008) found much weaker results in their cross-country growth regressions, when using a sample of 93 developing or emerging countries, including 16 East Asian countries. The number of phone lines had a positive effect on growth, and some evidence emerged of an above-average effect for East Asia and high income countries. However, most results were not robust to using panel techniques or to controlling for an endogenous response of infrastructure to growth. As a matter of fact, while Seethepalli et al. (2008) argued that the use of infrastructure stocks rather than flows alleviate the problem of reverse causation, they failed to control for the potential endogeneity of infrastructure stocks due to countries' unobserved characteristics, leading them both to have higher infrastructure stocks and higher growth; and did not include country fixed effects.

Indirect effects matter because they are instrumental in determining whether the effects of infrastructure investments are permanent or transitory. The belief that indirect effects may be sufficient to generate constant returns on aggregate and lead to endogenous growth underlies for example the claim in Calderón and Servén (2004) that raising Latin American quantities and qualities of infrastructure stocks to East Asian tigers' level would have generated long-term per capita growth gains of around 3%. Straub (2010) claimed that an alternative take on these numbers was that the different overall incentive structures prevailing in Latin America and East Asian countries implied that their economies displayed, in equilibrium, important gaps both in their infrastructure stocks and in output growth. However, it was not clear which part of these incentive differences had to do with infrastructure, and the lack of an empirical method to disentangle externalities from different sources implied that Calderon and Serven (2004) estimates might have been biased upward. Indeed, several contributions have shown that infrastructure investments returns were highly sensitive to the quality of the regulatory or contractual framework, to the political economy environment, including aspects such as the efficiency of the local bureaucracy and potential corruption. For example, Guasch, Laffont, and Straub (2007 and 2008) show that concession renegotiations in Latin America in the 1990s were to a large extent due to regulatory and institutional failures, and there were reasons to believe that this contributed to the subsequent backlash against private participation and discouraged private investment in infrastructure there in more recent years. The fact that East Asia focused mostly on build operate transfer (BOT) schemes for wholesale facilities, instead of concessioning of retail and distribution facilities as in Latin

America, and could mobilize its higher savings, may have created fewer incentive and information problems and reduced to some extent direct political concerns.

**Microeconomic**

A growing amount of micro-econometric evidence is providing insights into a number of specific channels linking infrastructure investment and development outcomes, such as household income and poverty, welfare, health issues such as child mortality, and gender empowerment, for example, in the labor market. Transportation infrastructure development has been shown to favor poverty reduction. Gibson and Rozelle (2003), using the timing of progressive coast to inland highway penetration in Papua New Guinea to instrument for road density, showed that reducing access time to less than 3 hours where it was above this threshold led to a decrease of 5.3% in the headcount index. Fan, Nyange, and Rao (2005) similarly found very positive effects of public investment and roads on household level income and poverty using Tanzanian household survey data. In an historical context, Donaldson (2009) showed that railroad development in colonial India significantly reduced trade costs, increased commercial exchanges between regions, with large overall welfare effects. Thomas and Strauss (1992) analyzed the determinants of child height in Brazil, a standard development outcome, and included electricity, water and sewerage connections as explanatory variables. They found the number of electricity connections per capita in the community to be positively correlated with height of babies, with a complementary effect of mother education. Positive results were also found for water and sanitation, with variations by children's age and level of mother's education. Dinkelman (2009) uncovered large effect on women employment of rural electrification in South Africa, which she related to an increase of their labor supply as a result of more efficient home production technologies, and of a job expansion in new, small-scale market-based services. In the case of water, in a widely quoted paper, Galiani et al. (2005) showed that in Argentina, increased household access to the water network following privatization significantly reduced the incidence of water-borne diseases related child mortality. Additionally, microeconomic firm-level data are interesting because they can be used to analyze the sequencing of reforms supporting infrastructure investment, in particular when the private sector is involved, and these reforms may include restructuring measures, regulation and the introduction of competition.

**Theory of Infrastructure – led development**

The theory posits that public provision of infrastructure is the main engine of long-run economic growth, provided governance institutions are adequate enough to ensure efficiency of infrastructure. The study therefore proposes to align the theory of long-run development based on public infrastructure as the engine of growth. The government, in addition to investing in infrastructure, spends on health services, which in turn raise labor productivity and lower the rate of time preference. Infrastructure affects the production of both commodities and health services. As a result of network effects, the degree of efficiency of infrastructure is nonlinearly related to

the stock of public capital itself. Provided that governance is adequate enough to ensure a sufficient degree of efficiency of public investment, an increase in the share of spending on infrastructure financed by a cut in unproductive expenditure or foreign grants may facilitate the shift from a low growth equilibrium, characterized by low productivity and low savings, to a high growth steady state**.** Infrastructure development may also boost the productivity of other factors in a production process (Fedderke and Garlick, 2008). The productivity of capital such as machinery is enhanced by reliable energy supply. Economic growth is likely to be realized if public infrastructure is maintained at the right standards and quality; which increases the lifetime of private capital. The private sector will experience lower maintenance costs on their capital stock that makes them to invest in other areas of the economy which promotes further growth (Agenor and Moreno, 2006). The spill-over effects generated by public infrastructure may indirectly promote growth through increased foreign direct investment (FDI) inflows and trading activities (Agenor and Moreno, 2006; Fourie, 2006; Fedderke et al., 2006). Increased infrastructure development in regions with low infrastructure stock may integrate them into a national economy, encouraging private sector activities and thereby stimulate economic growth. Additionally, according to Jimenez (1995), investment in transport related infrastructure, energy and irrigation may enhance the productivity of factors used in a production process, hence higher growth in the long-run through enhanced market transactions and emergence of externalities among firms. Therefore, growth of total factor productivity (TFP) is driven by infrastructure stock and based on the assumption that, with a well-developed infrastructure, entrepreneurs can easily adopt technologies, consequently creating technical progress and economic growth.

**Infrastructure and economic development**

According to the World Bank (2014), infrastructure can have an enormous influence on the growth of an economy and provide substantial support. Infrastructure is one of the main pillars to enable an economy to grow and to give local, national and international actors a long-term perspective. The interrelation between infrastructure and economic prosperity/growth is a complex area of research involving many individual independent standards that interact at different levels. Despite the fact that there is a certain relationship between infrastructure and economic growth, researchers have not been able to agree on a specific ranking of the importance of infrastructure in terms of its impact on economic growth, as a variety of problems arise when investments are pooled at different economic levels, sectors and regions within a country (Estache & Garsous, 2012). Owusu-Manu et al. (2019) found that infrastructure, and electricity in particular, had some positive impact on economic growth. Studies by Gosh (1998) showed that infrastructure development was a crucial factor in ensuring long-term access to markets and facilitating further economic expansion. This makes it a crucial asset to strengthen local and national enterprises and to serve as the main attraction for international investment and multinational companies. According to Deng (2013), an adequate transportation network in the country is a crucial factor, as it enables the fast and effective flow and transport of raw materials, goods and human resources to the market. An

effective road infrastructure can have a huge impact on the efficiency of an economy and reduce the production costs of tradable goods (Deng 2013).

Improvement in infrastructure is linked to different benefits in an economy, which promotes economic growth. For example, increase in infrastructure development in a country is linked to reduced operational costs and time, increases the productivity of a given labour force and efficiency of firms. Economic activities rely heavily on the services provided by infrastructure in an economy. For instance, a well-developed transport infrastructure aids the movement of goods and services, reduces transport costs, as well as increasing accessibility to different markets (Aschauer, 1989; Gramlich, 1994). Theoretically, infrastructure is always treated as an unpaid factor of production which promotes growth; augmenting factors, thereby encouraging the productivity of labour inputs and private capital and generally acts as an incentive for firms relocation and long-run growth (Lewis, 1998)

**Challenges of infrastructure development for economic growth**

South Sudan has been embroiled into tribal conflicts since independence that has led to many citizens fleeing to neighbouring countries. It is difficult to predict when the conflicts will end. These conflicts have a negative bearing on the infrastructure development as most of the resources meant for infrastructure are used for security and peace negotiations. Therefore one major challenge of infrastructure development is political instability which scares foreign investment. The highest risks for foreign investment have been in developing countries, which are predominantly characterised by an immature or volatile political system. The greatest fear is the expropriation risk, which is the likelihood that the political administration of the host country could seize foreign-owned assets as it happened in Uganda during Idi Amin rule. Recently, this risk has become increasingly important due to international politics and the symbiotic nature of the development in emerging economies. Nevertheless, the growing number of foreign direct investment and the normality of international negotiations have created new risks. Henisz & Zelner (2010) noted that more value can be extracted from foreign companies through the more subtle instrument of regulatory control than through direct seizures.

It could be seen that the risk of discriminatory governmental changes in laws and policies, aimed only at foreign investors, could enormously reduce the investor's financial return. This can also happen when officials in host countries are unwilling (or unable) to enforce existing policies that should facilitate the security of foreign investment. This political uncertainty is difficult to measure or is rarely reported for fear of total financial loss. This makes it difficult to compare political risks with normal seizures, as they usually attract more attention in the form of press releases. This phenomenon may also constrain other traditional financial and contractual mechanisms that organisations use to avoid business risks. Henisz and Zelner, points out that to avoid such situations, it is essential to develop political management strategies that favour the incentives of government officials to redirect investors' returns.

Political risk is only one of many potential risks that arise during operation in emerging markets. A comprehensive risk assessment for emerging markets, in particular of the unique factors of a country's political and social environment, is necessary to understand the conflict dynamics that can arise between national and international actors. The current situation of already existing cultural, political or religious conflicts or disputes, which are likely to be exacerbated by foreign investment projects, should be taken into account (Menkhaus, 2015,). The complex dynamics of emerging markets can give rise to a variety of potential risks, which need not necessarily be of a financial nature. Shortages of skilled labour, corruption, trade embargoes, etc., can lead to enormous cuts in the return on investment.

According to Ansar (2016), high investment in infrastructure with little returns can result in negative consequences in an economy especially if it is debt financed. That is, large investment in infrastructure projects that are underutilised and unproductive can lead to economic and financial crisis. This can result in sovereign debt overhang, high monetary growth, financial market instabilities and economic vulnerability. The short-run effect of infrastructure investment on output also depends to a larger extent, on the timing of the business cycle (Auerbach and Gorodnichenko, 2012). As postulated in economic theory, the effect on growth of any public investment made during recession will be greater than if similar investments were made during a period of boom. This is due to underutilization of capacity during recession and therefore, any investment by the government is expected to generate higher returns on output because the idle capacity will be utilized in production. Whereas, due to limited capacity experienced during economic expansion, any public investment undertaken may produce limited economic gains in terms of output. Further, according to Stupak (2018), if such investments are made when there is full employment, then higher levels of inflation may be experienced and anti-inflationary policies that may be employed by the government are likely to lower the short-run output gains.

## Research Methodology

The research relied on publicly available materials, articles and reports from developing countries and within East Africa on the infrastructure development and its contribution to economic growth in relation to South Sudan. The literature relied on theory of infrastructure led development. Information was also obtained from 200 respondents that were sampled using purposive sampling technique through Interviews and focused group discussions. The sample of respondents included the directors from the Ministry of Finance and Economic planning, Ministry of infrastructure, Members of parliament and local government at community level as people responsible for allocation of resources for infrastructure and implementation and oversight duties.

## Presentation and Discussion of findings

In light of the findings based on public materials, articles, budgets, focused Group discussions and interviews with various stakeholders, I present the views with regards to the contribution of

infrastructure development for economic growth, challenges and suggestions for mitigation in South Sudan

**i) Infrastructure sector that has greater impact on economic growth.**

The respondents were asked in their views which sector had greater impact on economic growth. 70% (140) of the respondents opined that road infrastructure had greater impact, whereas 30% said electricity and 10% communication respectively. On further interrogation on why they thought so, majority of the respondents said roads serve more people and promote trade movement and security. They further noted that transportation infrastructure development has been shown to favor poverty reduction. This was in line with Gibson and Rozelle (2003), findings using the timing of progressive coast to inland highway penetration in Papua New Guinea to instrument for road density, showed that reducing access time to less than 3 hours where it was above this threshold led to a decrease of 5.3% in the headcount index. Fan, Nyange, and Rao (2005) similarly found very positive effects of public investment and roads on household level income and poverty using Tanzanian household survey data. In an historical context, Donaldson (2009) showed that railroad development in colonial India significantly reduced trade costs, increased commercial exchanges between regions, with large overall welfare effects. Similar results from the analysis of railroads in Ghana and Kenya showed that infrastructure investment could produce long-term economic gains by reducing trade costs and integrating markets, potentially transforming the economic landscape in poor, remote regions with high trade costs (Jedwab and Moradi 2016; Jedwab etal. 2017). Donaldson (2017) study of the Indian infrastructure further revealed that railroads decreased trade costs and interregional price gaps and increased interregional and international trade as well as real income level (Donaldson 2017).

**ii) Kinds of infrastructure needed in South Sudan**

Majority of the respondents averred that in order South Sudan to exploit the potential of economic growth, needs to invest heavily in infrastructural development for economic growth. 80% of the respondents said the government should open roads to link all the ten states and the counties in order to promote agricultural production, trade, investors and expand the tax base for economic growth. They further noted that since South Sudan is landlocked country, emphasis should be put on construction of link roads to neighbouring countries in the East African region for ease of trade.10% were of the views that more emphasis be put on Air infrastructure in the capital of the states and even counties since the states were very far from Juba International airport. Their argument was that road transport during rainy season was impassable hence would affect delivery of goods and services besides insecurity by militia. A further 10% averred that electricity infrastructure should be encouraged for enhancement of processing and providing power instead of generators. These findings concur with Stuck (2017) views that infrastructure accumulates capital stock and, as a result, would directly impact productivity. Thus, labor productivity can be increased by improving telecommunication, technology, education, and health facilities. Pradhan

et al. (2014) further averred that the advancement of infrastructure causes economic expansion and that the source can be unidirectional. The long-term effect on economic development of private investment and national infrastructure investment was favorable and vital. In addition, he noted that communication infrastructure significantly impacted Pakistan's economic prosperity and the same could be applied to South Sudan. Olaseni and Alade (2012) explained that infrastructure was strongly linked to economic growth. Studies by Calderon et al (2010) showed that increased access to essential services could reduce inequality, foster inclusion and support poverty reduction efforts (Calderon and Chong 2004; Calderon and Serven 2010). Micro-level evidence shows that the distributional effect of infrastructure investment could vary. For instance, Khandker et al. (2009) looked at road improvement projects in Bangladesh and found overall positive effects on output and poverty reduction; they also showed that the poorest households are those benefiting the most. Similarly, Jedwab and Storeygard (2016) pointed to the importance of taking the local context into consideration, given the evidence of heterogeneous effects of transportation investments in Africa which seem to favor small and remote cities.

**iii) Prioritisation and economic growth**

If a country finds itself in a situation where it is unable to trigger the initial start of economic growth, it is important to note in which infrastructure project it should invest initially. This is due to the fact that most developing countries do not have sufficient funds to invest in several projects simultaneously. The interviews revealed that countries that have already taken off in terms of growth, like Kenya and Ethiopia, have invested heavily in port infrastructure and major key roads connecting these seaports with urban areas and industry. Even without a perfect energy or water supply, a port and roads can open the country to the global market, bringing new opportunities and monetary values. Therefore, it seems that the first step should be to strive for better export and import links, facilitated by a policy that stimulates foreign trade. Landlocked countries in particular seem to focus on creating channels of access to the sea like the Lapset project connecting South Sudan to the port of Lamu and recently, to Ethiopia. More developed countries such as Kenya, Uganda, Rwanda and Tanzania started to develop a common rail network after having achieved some economic growth through road freight transport and seaports. Investment in rail is a plus to shift freight from road to rail to improve road quality, but it is not a necessary factor in initial economic growth a point to be considered by the government of South Sudan. It is imperative to develop first the road network before all other infrastructure. According to Deng (2013), an adequate transportation network in the country is a crucial factor, as it enables the fast and effective flow and transport of raw materials, goods and human resources to the market

**iv) Political and foreign influence in infrastructure development.**

The respondents were asked if there were political and foreign influence in infrastructure development projects in the country. All the respondents were in agreement that all projects in South Sudan have political and foreign inclinations. They further said that the exploration of the

oil attracted many foreign powers. As a result the struggle for infrastructure development currently is under the Chinese funding together with the oil exploitation. This has led to politicians coming up with projects and soliciting funds of which most of them end up being mismanaged through corruption. Since China does not interfere of governance, there is more appetite for Chinese loans than the western allies whose requirement is accountability, rule of law and good governance. Majority of the respondents said China has made South Sudanese poorer than before because of their policy on sale of oil by through cash means instead of infrastructure development. The respondents averred that the high level corruption in South Sudan was initiated by Chinese oil money. Participants noted that China is the source of easily accessible funds, unconditional credit, labour, knowledge and materials. They all pointed out that South Sudan is highly dependent on Chinese support as the Chinese have built almost all new infrastructures in the region and continue to provide funding. They all pointed out the long-term risks associated with the increasing involvement, as China finances, plans, and implements and operates most projects, subject to temporary control over certain infrastructure facilities. The relationship with China is perceived by all respondents as both positive and negative, as China has improved infrastructure and economic situation in the region at the expense of long-term risk. Furthermore, 20% respondents mentioned the lack of transfer of knowledge and skills from the Chinese workforce to the local workforce.

**v) Relationship between infrastructure development and economic growth**

All the respondents averred that there was a relationship between infrastructure and economic growth of a country. The hypothetical capital theory argues that public investment can boost private investment by increasing the returns on inputs by the private sector hence more private sector physical capital is demanded (Aschauer, 1989; Ramirez, 1994). This process according to Agenor and Moreno (2006) is known as complementarity effect. Turnovsky (1996) argues that complementarity effect occurs through the investment costs that private sector incurs when investing. For example, a good road or railway network in a given region may lower the costs incurred in setting up a factory. When the government develops key infrastructure such as roads, railways and new power stations, private sector activities may be induced due to positive spill-over effects generated from such infrastructure which boosts total factor productivity of private capital. When marginal productivity of private capital increases, the rate of returns of private investment rises, increasing their demand. Public investment can also enhance private investment by increasing their efficiency. For example, a well-developed public infrastructure facilitates trade by encouraging easier movement of goods and services, leading to reduced transportation costs and cost of acquiring private capital. This makes private sector investments more profitable and fosters private investment (Gjini and Kukeli, 2012)

**vi) Challenges of infrastructure development and economic growth.**

Majority of the respondents opined that long term financial overdependence on the country's immense debt with no audit on what the government has borrowed and what it spent on is a bomb in waiting. National governments seem to be taking money, despite the fact that there are associated risks. At the same time, administrations need to strike a balance between infrastructure development and the growing influence of foreign powers that finance it, knowing that infrastructure investment is necessary to lay the foundation for economic growth, even if this is done for the sake of long-term financial dependence. Other challenges ever emphasized by the respondents were corruption and lack of accountability for all the projects undertaken.

## Conclusion

This research investigated the contribution of infrastructure to the economic growth of South Sudan. The random effect technique was applied to estimate the study models. The study revealed various positive and negative findings regarding the effects of infrastructure on economic growth. The study showed that infrastructure, such as transportation, electricity and communication, positively impacted on economic growth. The capacity of businesses to produce goods and services more efficiently was an essential part of economic growth and boosted infrastructure investment if well targeted and, depending on the degree of crowding out, likely contributes to increased productivity over time, leading to higher GDP over the long term. Further, public infrastructure investments may affect employment in the near and medium term. Developing countries including South Sudan should take some steps to adopt advanced technology because technology plays a vital role in the economy.

## Recommendations

The study recommends for attraction of investors. Private investors are attracted to regions with well-functioning transport infrastructure, stable energy sources and good telecommunications infrastructure. In addition, economic growth symbolizes as stable macroeconomic environment and strong aggregate demand which are essential for private sector investment. Secondly, supporting and expanding off-grid electrification schemes. Programs that boost off-grid electrification through commercial means can be a viable option for South Sudan.. These options not only enhance access to modern lighting in the absence of grid electrification but also boost private sector development. Finally, infrastructure policies should direct more investment towards provision of transport, energy and ICT services, although, most of the infrastructure projects are mainly debt financed. This has led to high debt accumulation beyond recommended thresholds consequently impeding growth. It is, therefore, important for South Sudan to explore other alternative sources of financing infrastructure such as public private partnerships to minimize high debt accumulation. In addition, it is important for South Sudan to pursue prudent monetary and fiscal policies that ensure a stable macroeconomic environment free from corruption to encourage private investment.

**References**

Agenor, P-R. Moreno, D. B. (2006). Public Infrastructure and Growth: New Channels and Policy Implications. World Bank Policy Research Working Paper 4064, Washington, DC.

Agenor, Pierre-Richard, 2010, "A Theory of Infrastructure-led Growth," Journal of Economic Dynamics and Control, 34: 932–950.

Ansar, A., Flyvbjerg, B., Budzier, A. and Lunn, D. (2016). Does Infrastructure Investment lead to Economic Growth or Economic Fragility? Evidence from China, Oxford Review of Economic Policy, 32(3): 360-390

Arezki, Rabah, Patrick Bolton, Sanjay Peters, Frederic Sanama, and Joseph Stiglitz, 2017, "From Global Savings Glut to Financing Infrastructure," Economic Policy, 32: 221–261

Aschauer, D. (1989). Is Public Expenditure Productive? Journal of Monetary Economics, 23:177–200

Baum-Snow, Nathaniel, J. Vernon Henderson, Matthew A. Turner, Qinghua Zhang, and Loren Brandt, 2017, "Highways, Market Access, and Urban Growth in China," mimeo.

Bougheas, Spiros, Panicos O. Demetriades, and Edgar L.W. Morgenroth, 1999, "Infrastructure, Transport Costs and Trade," Journal of International Economics, 47: 169–89.

Calderon, Cesar, and Alberto Chong, 2004, "Volume and Quality of Infrastructure and the Distribution of Income: An Empirical Investigation," Review of Income and Wealth, 50: 87–105.

Calderon, Cesar, and Luis Serven, 2010, "Infrastructure and Economic Development in Sub-Saharan Africa," Journal of African Economies, 19(s1): i13–i87.

Calderon, C. (2009). Infrastructure and Growth in Africa. World Bank Policy Research Working Paper Series. No. 4914. African Sustainable Development Front Office.

Calderon, C. and Serven, L. (2010). Infrastructure in Latin America, Policy Research Working Paper No. 5317, World Bank, Washington D.C

Cavallo, Eduardo, and Christian Duade, (2011), "Public Investment in Developing Countries: A Blessing or a Curse?", Journal of Economic Dynamics and Control, 39: 65–81

Deng, T. (2013). Impact of transport infrastructure on productivity and economic growth: recent advances and research challenges. *Transport Reviews*, *33*(6), 686–699

Donaldson, Dave, and Richard Hornbeck, 2016, "Railroad and American Economic Growth," Quarterly Journal of Economics, 131(2): 799–858.

Donaldson, Dave, 2017, "Railroads of the Raj: Estimating the Impact of Transportation Infrastructure," American Economic Review, forthcoming.

Duflo, Esther, and Rohini Pande, 2007, "Dams," The Quarterly Journal of Economics, 122(2): 601–46.

Estache, A., & Garsous, G. (2012). The impact of infrastructure on growth in developing countries. IFC Economics Note

Estache, Antonio, and Marianne Fay, 2007, "Current Debates on Infrastructure Policy," Policy Research Working Paper, No. 4410, The World Bank

Esfahani, Hadi Salehi, and Maria Teresa Ramirez, 2003, "Institutions, Infrastructure, and Economic Growth," Journal of Economic Development, 70: 443–477.

Fedderke, J. Perkins, P. and Luiz, J. (2006). Infrastructural Investment in Long-run Economic Growth: South Africa 1875-2001, World Development 34(6): 1037-1059.

Fedderke, J. and Garlick, R. (2008). Infrastructure Development and Economic Growth in South Africa: A Review of Accumulated Evidence, Policy Paper No. 12.

Garcia, V. A., Meseguer, J. A., Ortiz, L. P. and Tuesta, D. (2017). Infrastructure and Economic Growth from a Meta-Analysis Approach: Do all Roads Lead to Rome? BBVA Working Paper No. 17/07, Madrid, Spain.

Gjini, A. and Kukeli, A. (2012). Crowding-Out Effect of Public Investment on Private Investment: An Empirical Investigation, Journal of Business and Economics Research, 10(5): 269-276.

Henisz, W. J., & Zelner, B. A. (2010). The hidden risks in emerging markets. *Harvard Business Review – HBR*, *88*(4), 88–95.

IEA (2019). Africa energy outlook 2019. World Energy Outlook Special Report. 29 November 2019, http://www.iea.org/reports/africa-energy-outlook-2019.

IMF (2017). Estimating the stock of public capital in 170 countries. Unpublished Manuscript, August 2019 Update, International Monetary Fund, Washington, DC.

Jedwab, Remi, and Alexander Moradi, 2016, "The Permanent Effects of Transportation Revolutions in Poor Countries: Evidence from Africa," Review of Economics and Statistics, 98(2): 268–84.

Jedwab, Remi, and Adam Storeygard, (2016,) "The Heterogeneous Effects of Transportation Investments: Evidence from Sub-Saharan Africa," mimeo, George Washington University.

Jedwab, Remi, Edward Kerby, and Alexander Moradi, 2017, "History, Path Dependence, and Development: Evidence from Colonial Railroads, Settlers, and Cities in Kenya," Economic Journal, forthcoming.

Jerome, A. (2011). Infrastructure, Economic Growth and Poverty Reduction in Africa. The Secretariat, Nigeria Governors' Forum, Abuja, Nigeria.

Khandker, Shahidur R., Zaid Bakht, and Gayatri B. Koolwal, 2009, The Poverty Impact of Rural Roads: Evidence from Bangladesh," Economic Development and Cultural Change, 57(4): 685–722

Lokshin, Michael, and Ruslan Yemtsov, 2005, "Has Rural Infrastructure Rehabilitation in Georgia Helped the Poor?" World Bank Economic Review, 19: 311–33

Medeiros, V., Ribeiro, R. S. M. and do Amaral, P. V. M. (2020). Infrastructure and Household Poverty in Brazil: A Regional Approach using Multilevel Models, World Development, 137: 1-14.

Menkhaus, K. (2015). *Conflict Assessment 2014, Northern Kenya and Somaliland*. Danish Demining Group

Mora-Rivera, J. and Garcia-Mora, F. (2021). Internet Access and Poverty Reduction: Evidence from Rural and Urban Mexico, Telecommunications Policy, 45: 1-22.

Mu, Ren, and Dominique van de Walle, 2011, "Rural Roads and Local Market Developmentin Vietnam," Journal of Development Studies, 47(5): 709–34.

Olaseni, M., &Alade, W. (2012).Vision 20:2020 The challenges of infrastructural development in Nigeria. Journal of Sustainable Development,5 (2),63.

Owusu-Manu, D. G., Jehuri, A. B., Edwards, D. J., Boateng, F., & Asumadu, G. (2019). The impact of infrastructure development on economic growth in sub-Saharan Africa with special focus on Ghana. *Journal of Financial Management of Property and Construction*, *24(3*), 253–273

Pedroni, P., & Canning, D. (2004). The Effect of Infrastructure on Long Run Economic Growth. Williams's college publication

Pradhan, R. P. (2014). Telecommunications infrastructure and economic growth: Comparative policy analysis for the G-20 developed and developing countries. Journal of Comparative Policy Analysis: Research and Practice,16 (5),401-423

Sahoo, P., Dash, R. K. and Nataraj, G. (2010). Infrastructure Development and Economic Growth in China, Institute of Developing Economies, Discussion Paper no. 261, Jetro.

Stupak, H. D. (2017).Book Review: Essentials of Septorhinoplasty: Philosophy-Approaches-Technique. Annals of Otology, Rhinology and Laryngology

Straub, S. (2008).Infrastructure and development: A critical appraisal of the macro level literature, The World Bank. 12(2),1-24.

Straub, S., &Terada-Hagiwara, A.(2010).Infrastructure and growth in developing Asia. Asian

Turnovsky, Stephen J., (1996). Fiscal Policy, Adjustment Costs, and Endogenous Growth, Oxford Economic Papers, 48, 361-81.

United Nations Industrial Development Organization (2016). The 2030 Agenda for Sustainable Development: Achieving the Industry-Related Goals and Targets, Vienna, Austria.

World Bank, 1994, World Development Report 1994 – Infrastructure for Development, The World Bank, Washington DC.