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Key Aspects of Infrastructure Development in Uganda

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Abstract
Uganda holds infrastructure development as one of its key priorities, and has made tremendous efforts towards infrastructure development, within the available means. However, the need, which is constantly growing, outweighs the available resources.This paper analyses Uganda's current and future infrastructure needs, citing obstacles to the achievement of the country's infrastructure development goals, and proposing solutions to the cited challenges. It asserts that the key areas that require infrastructure development in Uganda include transport, communication, energy, water supply, and healthcare. It cites the main drivers of the need for infrastructural development as: high population growth, urbanization, climate change, technological advancement and, general economic growth.Among other challenges, the paper emphasizes a shortage of funds as the main obstacle to infrastructure development in Uganda; and proposes engagement in public-private partnerships as the major solution to this challenge.
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1. Introduction

Infrastructure development is a key requirement for sustainable economic growth in any country. However, Uganda, like most developing countries, significantly faces not only future, but also current infrastructure deficiencies. The country's infrastructure, which mainly takes the form of transport, energy, communication and water systems has improved over time, but is still not sufficient enough to meet the country's development needs. This paper analyses Uganda's current and future infrastructure needs, citing obstacles to the achievement of the country's infrastructure development goals, and proposing solutions to the cited challenges.

The paper's main assertion is that Uganda undoubtedly holds infrastructural development as one of its key priorities, and has made tremendous effort to set up necessary developmental structures within its means. However, the need still outweighs the available resources. I therefore propose as a prime recommendation, that Uganda focuses on building public-private partnerships in order to meet its growing infrastructure needs, while maintaining fiscal sustainability.

The following section presents a summary of Uganda's current infrastructural state. This is followed by section 3, which discusses Uganda's future infrastructure needs and their drivers. Section 4 briefly lays out Uganda's efforts towards addressing its infrastructure needs; section 5 discusses the hindrances to infrastructural development in Uganda; section 6 proposes a way forward and; section 7 concludes.

2. Uganda's Current Infrastructural State

2.1 Transport Infrastructure

Uganda has four major means of transport, namely; roads, water, air and railway. According to Uganda's Ministry of Works and Transport [MoWT] (2017), roads are the prominent means, accounting for more than 90% of cargo freight and passenger movement. The country dedicates a large chunk of its national budget annually to road construction, but even then, the country's roads, and other means of transport are still way below desirable standards. The country has a poorly established public transport system and "as of June 2017, the paved road network was 4,257 km while the unpaved was 16,388km" (MoWT, 2017). Moreover, even some of the paved roads are in a terrible state, bearing potholes, gullies and other impediments.

Uganda has a railway network (popularly known as the Uganda Railway), that was constructed between 1896 and 1901 (Gunston, 2002). This network has hardly been expanded since its construction. Parts of it are in use and other parts are desolate. The active parts of it are mainly used for transporting cargo. In 2015, passenger railway transport, which had died out several years ago, was revived in Kampala City. However, the residents still await its expansion; currently, there is only one passenger train, that only covers one route. Clearly, there is need for reinforcement in this section of transport. According to the MoWT (2017), there are fourteen national airports in Uganda. The main one, which is also international, is called Entebbe Airport. Efforts have been made to refurbish it over time, but there is still much room for its improvement. Water transport, just like all the other means, bears big infrastructure deficiencies.

2.2 Energy Infrastructure

Uganda has a great untapped energy potential. According to Oluwabmni (2015), the country has a hydroelectric energy potential of 2,200MW, with actual installation of only 680MW; a biomass energy potential of 1,650MW, with actual installation of only 125MW; and a solar energy potential of 200MW, with negligible actual installation. He further states that Uganda's total ascertained energy potential is 5,300MW, but actual installation only taps 810MW. The country has vast unmet energy needs; hence, the large untapped potential is a clear reflection of the enormous infrastructure shortage in the energy sector.

2.3 Communication Infrastructure

Communication infrastructure in Uganda has grown tremendously over the last decade. "Uganda's telecommunications infrastructure is increasing at a 10 percent annual growth rate" (U.S. Department of Commerce, 2017). A vast number of communication innovations have been adopted in the country, including internet usage, digital TV networks, contemporary mobile phone technology, etc. According to Uganda's Ministry of ICT (2015), several sites around Kampala and Entebbe have been connected to the National Backbone Infrastructure to provide them with access to high speed internet. The drawback in this sector is that its infrastructure development is mainly driven by multinational companies, whose interests are vested in urban area investments, from which they can get a decent return on investment. This leads to inadequate investment in communication infrastructure in Uganda's rural areas.

2.4 Water Infrastructure

Majority of Uganda's population accesses water through rudimentary means, drawing it from shallow wells, boreholes and springs. Around the major cities, there is wide coverage of the national piped water system; however, in rural areas, water infrastructure is greatly lacking.

2.5 Health Infrastructure

In its rural areas, Uganda has a huge shortage of health infrastructure. There are several hospitals and health centers scattered in the countryside, but they are not sufficient to provide healthcare to all the rural masses. Moreover, even most of the existing health facilities have big shortages of health equipment and medical workers. The shortage in health infrastructure is exuberated by the poor transport network which makes it very difficult for patients in rural areas to travel long distances from their homes to the health facilities nearest to them.

3. Uganda's Future Infrastructure Needs and their Drivers

The world is constantly in a state of social and economic transformation. Because of this, Uganda's infrastructural needs are expected to evolve over time. This section gives a sneak peek of the country's expected infrastructural priorities a few decades down the road, along with the expected drivers of the needs.

The key envisaged priorities include reinforcements and innovations of infrastructure in transport, energy, communication, water supply, health, industry, and other economic segments. Examples of specific projects include, construction of more hospitals, widening of existing roads, construction of fly-over roads in the city, installation of intelligent/ advanced traffic light systems to reduce traffic jam in the capital city, solar energy advancement, construction of an oil refinery, setting up infrastructure for oil energy usage, extension of piped water and sewerage systems to the entire country, creation of satellite cities, extension of the national backbone infrastructure for wider internet access, etc. The drivers of these needs are discussed below.

Uganda has a fast growing population, and its prospects of significant fertility reduction are still distant. According to the U.N. Department of Social and Economic Affairs (2015), Uganda's population is projected to grow by more than 50% between 2015 and 2030. Because of this, it is logical to presume that the higher future population will have greater energy, transport, water, healthcare, communication and social needs. All these will require fortified infrastructural development, for example, building or expanding the capacity of existing power generation dams, improving the public transport network, expanding the coverage of piped water supply, building more hospitals, etc.

The problem of high population growth is exuberated in the cities due to high levels of urbanization and motorization. Like most emerging economies, Uganda faces a big challenge of rural urban migration. Over time, this will be further fueled by climate change, whose effects are anticipated to make life close impossible in the rural areas, ceteris paribus. Climate change is expected to adversely affect agriculture and cause water shortage, and these are the key essentials for survival in rural areas; hence, the rural population will have no option but to seek refuge in the cities. The country has only a few cities, and they have insufficient infrastructure even in their present states. An influx of people from the rural areas will put more pressure on the already strained cities' infrastructure.

Additionally, climate change is projected to cause heavier seasonal rains and flooding in the country. This development has already been seen to cause flooding and paralysis of the capital city's transport network during

rainy seasons. This situation is bound to get worse over time. Hence, it calls for construction of roads with better drainage systems in order to avoid obstruction economic activity during rainy seasons. Furthermore, prolonged dry seasons will render rudimentary water extraction methods useless. Shallow wells, springs and boreholes will dry up, and this will necessitate extension of modern water and sewerage infrastructure to a larger portion of the population. Climate change will also affect hydro-electric power generation capacity, if water levels of lakes and rivers fall. This will necessitate development of infrastructure to support exploitation of different forms of energy, for example, solar and geothermal energy.

Another key driver of the country's infrastructure priorities in the near future is technological advancement. Fast growing trends in technology in almost all sectors of the economy will render a significant portion of existing infrastructure useless. This has already been experienced in areas like telecommunication. Telephone poles and other old-fashioned telecom infrastructure which were of great importance twenty years ago, are now of no use in the current mobile phone era. Needless to mention, new technological trends will come along with new infrastructure needs.

General economic growth will also play a major role in transforming the country's infrastructure needs. For example, if the economy gradually transforms from being predominantly driven by agriculture to being driven by dynamic sectors like manufacturing and services, this will require infrastructural transformation as well. This kind of infrastructural transformation will most likely be driven by the private sector, and the government will hold its ever-present role of creating an enabling environment.

4. Uganda's Efforts towards Addressing Its Infrastructure Needs

Uganda holds infrastructure development as one of its key priorities. The government rightfully asserts that "priority allocations are being made to power generation, road networks, irrigation schemes, schools and improvement of health infrastructure" (NITA-U, 2017). Every year, a sizeable proportion of Uganda's national budget gets allocated to infrastructure development; nonetheless, the need still outweighs the resources.

The government runs several infrastructure development programs, for example, "with support of the World Bank, [the government] funds the Energy for Rural Transformation (ERT) Program that aims to increase access to modern, clean and affordable energy to rural areas" Oluwabmni (2017). In order to facilitate ICT oriented communication advancement, a government agency, National Information Technology Authority-Uganda (NITA-U), was established in 2009. Among other things, this agency seeks to continually upgrade Uganda's ICT infrastructure, to keep the country in sync with world trends.

Kampala Capital City Authority (KCCA), following its strategic plan of 2014/15-2018/19, has continually sought to "rebuild key institutional, infrastructural and social structures that drive the delivery of goods and services, and respond to the challenges of increasing urbanization influenced by a younger population and influx of rural-urban migration" (KCCA, 2017). Indeed, KCCA's efforts to refurbish Kampala's infrastructure in recent years, are eminent. However, the Authority rightfully notes that the funding needs exceed what Uganda's current national budget can provide.

5. Hindrances to Infrastructural Development in Uganda

The major obstacle to infrastructural development in Uganda is lack of funding. The country, which is weighed down by poverty, has so many priorities competing for its limited financial resources, for example; healthcare provision, education advancement, agricultural modernization, etc. The will and skill to develop adequate infrastructure are in abundance, but the necessarily funds are not available. Several infrastructural development plans have been drawn by government agencies, but unfortunately, they are rendered impractical by a shortage of funds. Funding aid has been sought from development partners (mainly in form of government borrowing) for some of the ongoing infrastructure development projects, but there is a limit to how much debt a country can accumulate and still remain in a sustainable fiscal state.

Arguably, Kampala City is an irredeemable state. The responsible authorities can only do so much to improve the situation, but total transformation of the city can't be achieved, as this would require demolition of most of the existing buildings, to make room for a sufficient transport network, for example. Most structures in the city were set up in an ad hoc manner, without following an over-riding city plan, and now, the damage is too big to be undone. This kind of situation requires a fresh start, through formation of satellite cities; but again, the funding needs render this approach impractical. To make matters worse, infrastructure development initiatives in the city are often met with political resistance, for example, people who unlawfully constructed houses on railway property and on road reserves vehemently resist eviction, and this leads to political turmoil.

Other challenges, as discussed earlier include: intense urbanization and motorization in the capital city, climate change effects, technological transformation that renders existing infrastructure useless, and failure to match economic growth with necessary infrastructural development. Effects of economic growth are observed when, for example, longstanding bridges that were designed to carry light loads/vehicles, end up carrying modern-day vehicles that are much heavier than the planned capacity and, the city's road infrastructure, which was designed

to accommodate few thousands of vehicles, carries hundreds of thousands of them. Economic growth is undoubtedly good, but it ought to matched with construction or upgrading of the necessary infrastructure.

6. Proposals for Addressing Uganda's Future Infrastructure Needs

As earlier mentioned, Uganda already holds infrastructure development as a key priority, but its main shortcoming is insufficient funding. Hence, this paper's main recommendations are centered on mobilsation of funds. In order to maintain fiscal sustainability, Uganda shouldn't be so heavily bent towards borrowing, but should focus on building public-private partnerships. These are very relevant where it's feasible to charge fees and tolls on service provision, for example; road tolls can be charged where city by-pass roads have been constructed, charges can be levied for use of energy alternatives like geothermal energy, etc. Public-private partnerships don't only lighten the government's funding load but "can [also] potentially mitigate the overruns and schedule delays that plague traditional infrastructure project delivery by clearly delineating governance, allocating shared risk, integrating resources, applying best practices, and establishing a life cycle–long perspective of costs and accountability" (Rocca, 2017). To attract such investment from the private sector, both at local and international levels, the government has to create a stable macroeconomic and political environment, in order to build investor confidence. The government also ought to ensure that the contracts signed with private investors have no loopholes that could enable suppression of Ugandans, both in the rural and urban areas.

Additionally, Uganda ought to explore all available channels to ensure improved domestic revenue mobilization, in order to avail more funds for infrastructure development in all sectors. This requires co-operation and information sharing between government agencies in order to help curb tax evasion and widen the tax base. The government should further empower its tax administrators to collect taxes without political interference.

Now that the country has a budding oil industry, some of its future funding needs will be met by use of oil revenue. This is not to say, however, that oil exploration will meet all the country's pending financial needs. Nevertheless, wise choices can be made to ensure that oil revenue is well invested to benefit both the country's current and future generations, covering key areas of necessity. In my opinion, extension of piped water infrastructure to the entire country is one of the worthwhile investments for oil revenue, especially bearing in mind that climate change will hit the country's water supply hard, a few years down the road.

Relating to energy needs, Uganda should ride on climate change and benefit from the projected prolonged dry seasons, by generating solar energy from the abundant sunshine. This is, however, an initiative that the government might have to simply encourage, and perhaps subsidize, but the burden of implementation will mostly fall on the private sector. It is more efficient for the government to invest in infrastructure projects with large fixed costs, whose benefits extend to a large number of people. However, solar energy's fixed costs are typically spread across individuals who purchase solar panels; and the benefits of each investment / panel are confined to an individual or a limited number of people. Solar energy, therefore, can't be categorized as a public good, and its provision is better off left to the private sector, since there is no free rider effect in its market. The government, however, still holds a major role of sensitization and creating an enabling environment for people to take on such investments.

Additionally, Uganda should consider exploration of geothermal energy, and the government should plan to set up the necessary infrastructure to make this possible. This form of energy, which is derived from the earth, is abundant and inexhaustible. "It has been present for 4,500 million years and will be present for billions of years into the future. It flows through the earth constantly, 24 hours a day, 7 days a week, rain or shine, eon upon eon" (Kato, 2016). Adopting geothermal energy usage will give the country the sustainable energy assortment that is necessary for coping with climate change, which is bound to reduce energy supply and call for construction of more energy infrastructure. Moreover, anticipated economic growth will also create more energy requirements.

7. Conclusion

Uganda holds infrastructure development as one of its key priorities, and has made tremendous efforts towards infrastructure development, within the available means. However, the need, which is constantly growing, outweighs the available resources.

This paper asserts that the key areas that require infrastructure development in Uganda include transport, communication, energy, water supply, and healthcare. It cites the main drivers of the need for infrastructural development as: high population growth, urbanization, climate change, technological advancement and, general economic growth.

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