

# The Role of Engineering Personnel and Allied Professionals in Resolution of the Infrastructure Crisis in Uganda

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**Abstract**—Infrastructure is generally seen as the fulcrum on which human and national development resolves, as the advancement of any human race and nation state is judged by its level of infrastructural development. For the existence of the total man, the importance of infrastructure cannot be overemphasized. This paper discusses the factors affecting the provision, management and maintenance of infrastructure in Uganda. It suggests ways by which the yawning gaps in infrastructure deficits could be closed. It is proposed that STEM (science, technology, engineering and mathematics), good governance and adequate funding of infrastructure should be given top priority. It also advocates that adequate recognitions and acceptance of Engineering Personnel as drivers of Engineering based organization, programmes, and establishment should be unequivocally embraced.

**Keywords**—Engineering; Personnel; Allied; Professional; Resolution, Infrastructure; Crisis, Role

## 1. INTRODUCTION

Every family and business needs infrastructure to thrive – from the road we travel to work, to the pipes that deliver clean drinking water, to the telephone we use to communicate, to the inland waterways and rail that move goods from coast to coast. It is often said that without infrastructure, man will perpetually remain in the Stone Age.

According to biblical history (NIV, Genesis 1-3) (2013) Reference [1], the world was created by God and handed over to man to cultivate (develop). This literally means man was invited by God to partner with Him in the running of the world. In accordance with this biblical injunction, man from time immemorial has been undertaking the development of infrastructure in one form or the other, more so as it touches on his very existence.

### 1.2 What is Infrastructure?

There is no single definition for the term “infrastructure”. It is a term used in a variety of disciplines. The “Merriam Webster” dictionary Reference [2] defines infrastructure as “the underlying foundation or basic framework (as of a system or organization)”. The Collins English dictionary Reference [3] defines infrastructure as “the stock of facilities, services and equipment in a country, including factories, roads and schools that are needed for it to function properly”.

It can be seen from the above definitions that infrastructure is the world’s system of public facilities, but publicly and privately funded, which provide the delivery of essential service and a sustained standard of living. The facilities are of structure that are somewhat self-contained, yet interdependent and provides for mobility, shelter, services and utilities. Infrastructure is based upon which the society rest as its condition affect or lifestyles, health and security, KIIDP (2013) Reference [4], KIIDP (2020) Reference [5].

A country cannot function properly without infrastructure Piper, Alison. (1997) Reference [6], Hawthorne, Karen (1999) Reference [7], therefore it is said to be of national strategic importance to develop and upgrade infrastructure in order to meet the increasing demands that are arising from economic and population growth, infrastructure is very importance for an economic. One major different between a developed economy and a less developed economy is quality of infrastructure, National Priorities Reference [8]. Most infrastructural developments are capital intensive – lot money needs to be spent in order to put them in place. The payback in monetary terms (if any) may take many years. In other cases there may never be a direct monetary payback.

### 1.3 Examples of Infrastructural project

- Highways, streets, bridges, tunnels and transportation
- Water supply, treatment, and distribution
- Wastewater collection, treatment and disposal
- Solid waste collection, treatment and disposal
- Electric power generation and supply

- Communication facilities
- Courthouses, schools, libraries and hospitals
- Police station, fire houses, prisons and garages
- Public residential housing

#### 1.4 The Role of Infrastructure

The importance of infrastructure is two-fold.

- It is instrumental in promoting economic growth
- It plays a role in alleviating poverty.

It plays significant role in the technology, biological, social and economic life of every society.

## 2 REVIEW HISTORY OF INFRASTRUCTURE DEVELOPMENT IN UGANDA

According to Wikipedia Reference [9], Reference [10], Infrastructure development in Uganda is dated far back to the pre-colonial era when natives used crude technology and communal efforts to build roads, markets etc. However, colonization, there came the British masters with their technology and constructed roads, railways, water treatment plants, schools etc. The transportation system was mostly to move goods from the hinterland to the port for exporting to the western world. At independence, the Uganda government inherited these infrastructures and subsequent governments have been developing more of them.

### 2.1 Status of Infrastructure in Uganda

For the purpose of this discussion, we will limit ourselves to infrastructures of roads, railroad, airports and communication networks.

#### 2.1.1 Road Infrastructures

Uganda road system has come a long way from 1896 when it was known as Kenyan-Uganda, Hizaamu Ramadhan (2018), Reference [11], Sanghamitra Bandyopadhyay (2012), Reference [12] and when there was less than 120km of paved and unpaved roads to a network currently in excess of 21,000km. The road system is the most important element in the country's transportation network, carrying about 95 percent of all the nation's goods and passengers. Uganda has about 21,000 kilometres (13,000 miles) of national roads. Of this total, 4,000 kilometres (2,500 miles) are paved, 1,500 kilometres (930 miles) are gravels, and 15,500 kilometres (9,632.12 miles) are of unimproved earth.

It is unfortunate that most of the road system in Uganda is in disrepair and barely useable. Massive traffic jams are very common in the large cities. There are also long delays in the movement of goods. Highway accidents and deaths are frequent, and number more than 45,750 and 10,675 persons respectively. Most developed nations in the world jump-started their economics by accelerating their infrastructure and building on it: examples being those of India and the United State of America. The late President J.F. Kennedy of USA once stated that "America has good roads, not because America is rich, but America is rich because it has good roads" Danielle Petterson (2016) Reference [13]. The crux of this matter is that a country cannot be rich without good infrastructure. All the great civilizations attained greatness only through the entrenchment of adequate and sustainable infrastructure.

#### 2.1.2 Railway Infrastructure

Railway construction in Uganda began in 1896 Hizaamu Ramadhan (2018)[11], Sanghamitra Bandyopadhyay (2012)[12], from port of Mombasa area with extensions along Nakuru route to Soroti through Tororo in 1920 to 1926 before coming down to Jinja through Namasagali and from Jinja to Kampala in 1931. Before being extended to Kasese western Uganda in the year 1956 and the Northern rail reaching Arua in 1964. Uganda can boast of network of railways which provide Uganda's second means of transportation. The rail system consist of 1,266 kilometres (786.73 miles) routes of 1.067 meters gauge (3.5 feet), 1,567 tracks kilometres.

Uganda rail system is gradually phasing out despite attempts by government at regional and central levels to bring it back to life. Most of the old rail projects are abandoned while attempts to refurbish functional ones are done haphazardly. However, today there are no new railway lines being constructed in standard gauge despite several promises and attempts by previous and present governments at all levels.

## 3 The Infrastructure crisis

Despite the importance of infrastructure for economic and social well-being especially now that we are being face with the challenge of the **COVID 19** pandemic in the year 2020, all countries of the world are faced with their own various degree of problems. It is well known fact that whereas infrastructure in developed countries is old, unreliable, inefficient and in need of replacement and upgrading, in developing countries like Uganda Claire, Bouch (2020) Reference [14], KCCA (2020) Reference [15], KCCA (2016) Reference [16], essential infrastructure are often not available or in-short supply. Large portions of our urban and rural populations have no access to water and sanitation. Power supply is non-existent or unreliable and people are faced with frequent power cuts. Quality of roads infrastructure is often bad, leading to long travel times and increased vehicle maintenance costs. Wide roads are also a constraining factor leading to traffic jams and grid locks Moses .K (2016) Reference [17].

### 3.1 WHY DO WE HAVE SO MANY PROBLEMS WITH INFRASTRUCTURE?

This particular question and ways in which to solve it will focus of this entire paper. It is therefore impossible to answer this question right away. Before we conclude this paper, we will list out a few of the causes for the failure to provide adequate infrastructure, viz:

- Lack of funds
- Lack of implementation and management capacities
- Corruption
- Bureaucracy
- Unfair competition
- Land acquisition issues involving dealing with displaced people and special interest groups etc.
- Inadequate attention to STEM
- Non involvement of Engineers

### 3.2 THE ROLE OF ENGINEERING PERSONNEL AND ALLIED PROFESSIONALS

Andrews and Herbert (1997) Reference [18], says that engineers in providing solutions to planning, construction, maintenance and management of infrastructure are engaged in framing of problems and using quantitative tools to solve it, employing tools: uncertainty/risk analysis, optimization, probability, graph/scheduling charts, etc. in the world today, it is only Engineers and probably those that think Engineering that can drive infrastructural development.

Engineers are demi-gods, are the pivot on which the general economic revolves. I quite understand that there are political actors and the political and economic pressures under which they have its potential o complicate their ethical choices, they must however imbibe the ethical dimension to engineering endeavours to adhering to the canons. Therefore Engineers should:

- Contribute to building a sustainable society, present and future
- Apply professional and responsible judgment and take a leadership role
- Do more than just comply with legislation and codes
- Use resources effectively and efficiently
- Seek multiply views to solve sustainability challenges
- Manage risk to minimize adverse impact to people or the environment

All this Engineers and their allied professionals can only do when they rightly identity roles of engineers in the society and be prepared to apply cutting edge technology in the conceptions, designs, constructions and maintenance of the infrastructures Rupa .R, V. Foster, Reference [19]. They must be actively promoting and participating in multidisciplinary terms with other professionals such as: ecologists, economists, medical doctors and sociologists to effectively address the issues and challenges of perceive recession on African by the WHO, UNICEF and other global organizations due to the ravaging effect of the **COVID 19** pandemic on the global economy.

Today, more than ever, the world is in dial need of help as we can see nations globally soliciting for assistance due to the ravaging effects of the **COVID 19** on the global economic. Engineering personnel and allied professionals should rise to this great challenges of infrastructural deficit by providing strong leadership, be involve in thoughtful policy making and investments that produce effective and conjugal impact on Uganda economy.

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