Manpower Planning for Attainment of the Middle Income Status:

Opportunities, Challenges and Prospects

Dr Isaac Mutenyo

3rd November 2017

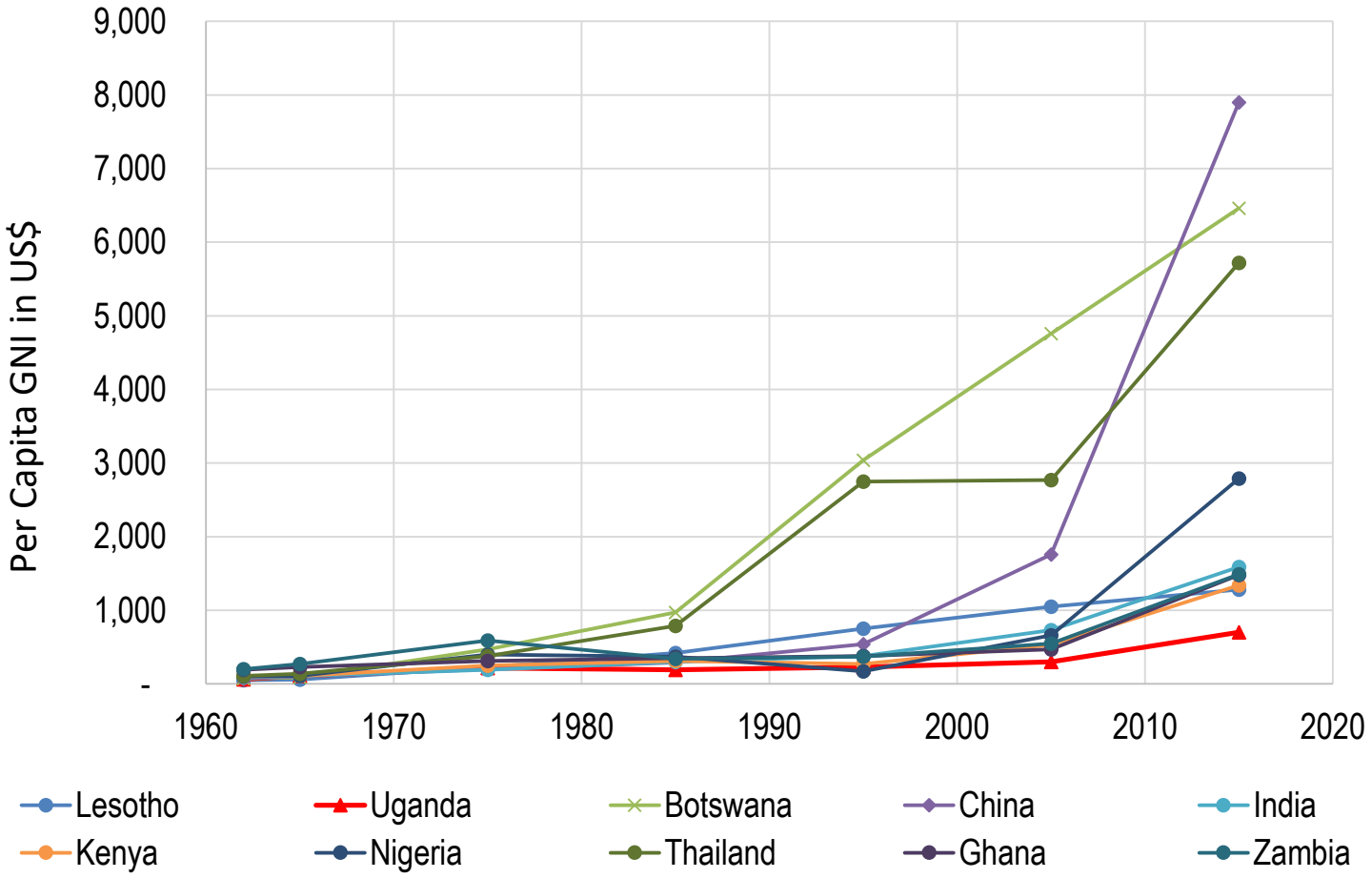
Content of the Paper

1. Middle Income Status: *Where are we*?
2. Status of Engineering Manpower
3. The Demand for Engineering
4. Key Challenges to Engineering
5. Recommendations

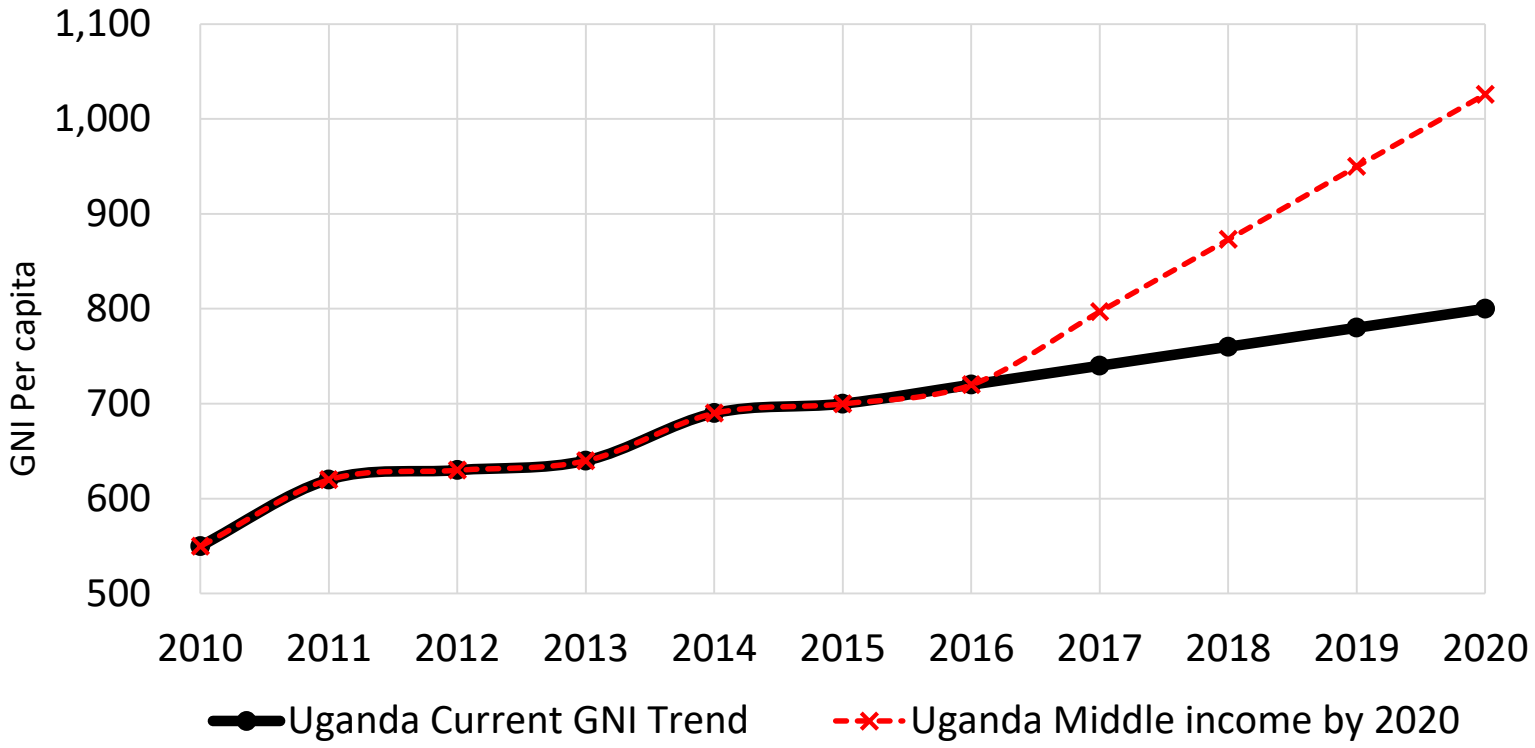
Middle Income Status

- A middle-income country is one with a Gross National Income(GNI) per capita between US$1,026 and US$12,475.
- Uganda with a per capita GNI of US$ 700 (2015) is a low income country.
- Therefore Uganda must raise its per capita GNI from US$ 700 to US$ 1,026 to transit to middle income status.
- By the time of its independence in 1962, Uganda's per capita GNI was comparable to that of Lesotho, Botswana, China, India, Kenya, Nigeria, Thailand and Korea Republic.

GNI Per capita for selected Countries



Trend of Uganda's GNI Per capita over the period 2010 - 2015



>>>>> Given the current growth rate it will not be until 2026 that Uganda will attain the middle income status

Engineering Manpower

- Industrialised countries have 20-50 engineers per 10,000 population.
- Developing countries have about 5 engineers per 10,000 population.
- Uganda has <1 Engineer per 10,000 population.
- This lack of engineering expertise is a serious constraint to the development and future of developing countries.
- The lack of qualified engineers and technicians is currently reported to be one of the principal obstacles to economic growth.
- Surprise: Even with these low numbers of engineers there are many engineers without beneficial employment while at the same time there are many foreign engineer practicing here.

Engineering Training in Uganda

- For the period 1997 to 2006, Makerere University was passing out on average 167 engineers annually.
- Between 2006 and 2016 Makerere University graduated on average 321 engineers per year, almost double the number between 1997 and 2006.
- However, during the period 2006 to 2016, the average students' annual admission to engineering courses in Makerere was 713 students meaning that on average 54% of admitted students did not graduate.
- From 2006 Makerere University started admitting Diploma students in engineering and by 2016 after ten years, total admission was 283 students and only 97 had completed their courses.

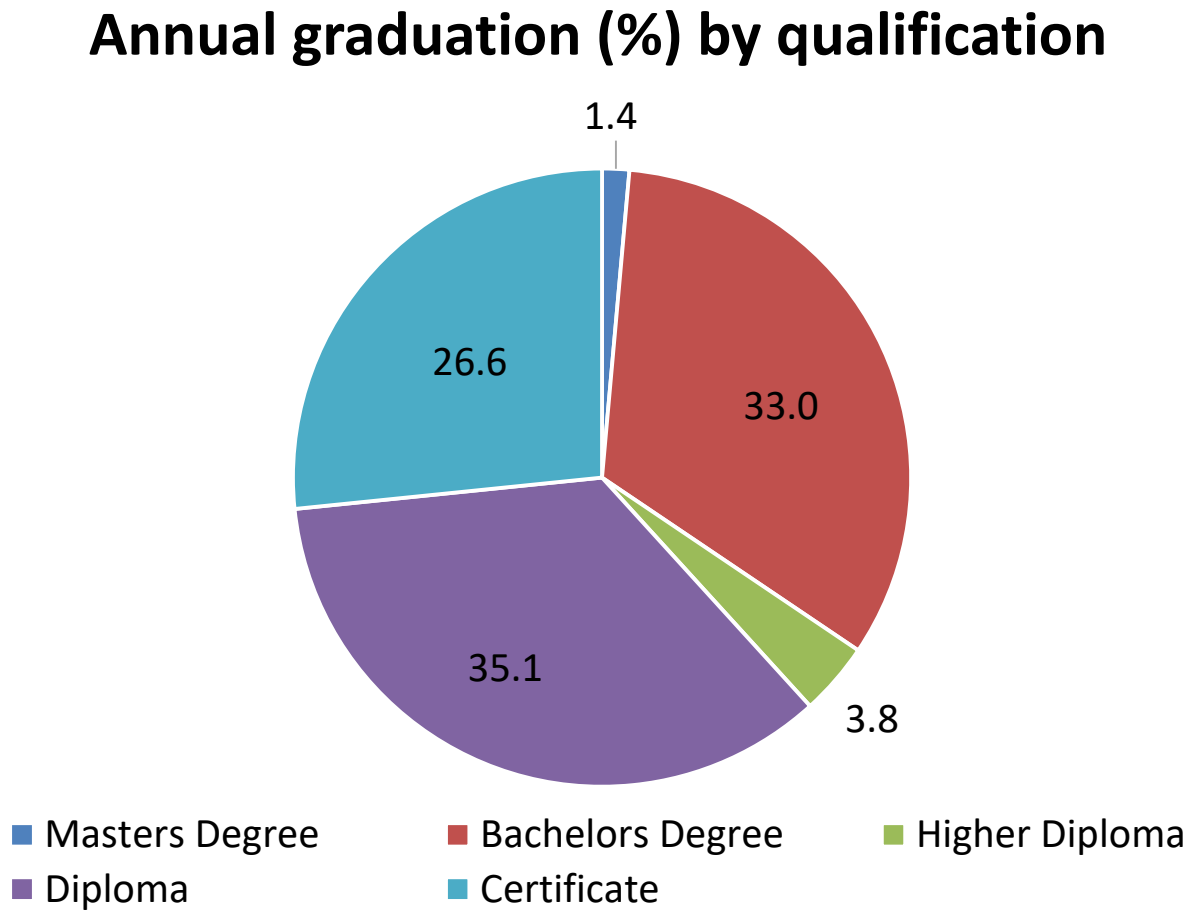
- Between 2006 and 2016, Kyambogo University was graduating on average 394 engineers annually.
- During the same period, the university passed out on average 79 higher engineering diplomas and 265 ordinary diploma annually.
- The number of higher diplomas graduating reduced by almost half after introduction of the degree program.
- Makerere and Kyambogo Universities together pass out about 715 engineers at degree level annually. In addition about 79 higher diplomas and 265 ordinary Diploma graduates are passed out annually from the two largest Universities.

- There are at least 7 other universities (both Public and Private) offering engineering training.
- It is estimated that these universities may be graduating about 1,000 degree holders and less 300 diploma holders between them. In addition it is estimated that external universities bring in about 50 masters and 100 bachelors Ugandan graduates into Uganda.

Technical Training

- There are 5 public National technical colleges in Uganda : UTC Elgon; UTC Lira, UTC Kichwamba; UTC Bushenyi and UTC Kyema.
- UTC Elgon admits the largest number of students averaging 403 for diploma courses and 325 for certificate courses annually over the period 2006 to 2016.
- It is estimated that the other 4 public technical colleges graduate about 600 diploma graduates and 800 certificate holders between them annually.

It can therefore be estimated that annually about 5,500 Ugandans graduate with different qualifications into the engineering market in Uganda



Engineering Regulation

- In order to ensure that all works of the engineer meet the demand of society, the profession must be regulated.
- The purpose of regulation is to assure the quality of professional services in the public interest.
- Regulation involves the setting of standards of professional qualifications and practice; the keeping of a register of qualified persons and the award of titles; determining the conduct of registrants, the investigation of complaints and disciplinary sanctions for professional misconduct.
- The main approaches to professional regulation are Licensing, Registration and Specialist Lists.
- The Engineers Registration Board (ERB) and the Uganda Institution of Professional Engineers (UIPE) are two main bodies involved in the regulation of engineers

How many Engineers are Regulated?

- ERB and UIPE maintain registers of licensed engineers and institutions members respectively.
- The ERB Register of 2016 had a total of 593 registered engineers of which 14 were temporary registered engineers.
- All Temporary registered engineers are civil engineers with bachelor's degrees except one who had a master's degree.
- 50% of the Temporary Registered engineers had acquired there degrees from Ethiopia while 28% had acquired there degrees from India.
- *The number of registered engineers in Uganda are too low. By comparison, Tunisia with a population of 11 million has more than 22,000 registered engineers.*

Local Registered Engineers - ERB

Table 1: Numbers by Qualification

Qualification	No. Registered	%
Diploma	12	2.1
Bachelors	225	38.9
Diploma & Bachelors	54	9.3
Diploma & Masters	16	2.8
Bachelors & Other Non- Engineering Masters	16	2.8
Masters	214	37.0
PhD	42	7.3
Total	579	100

Table 2: Numbers by Discipline

Engineering Discipline	No. Registered	%
Agricultural Eng.	7	1.2
Civil/Environment Related Eng.	429	74.1
Electrical related Eng.	73	12.6
Mechanical Related Eng.	70	12.1
Total:	579	100

Engineers with postgraduate qualifications (Masters and PhD) make up about 50% of the register.

UIPE Membership by July 2017

S. No	Membership Class	No.	%
1	Fellow	29	1.6
2	Corporate	809	43.5
3	Graduate	931	50.1
4	Technologist	51	2.7
5	Technician	39	2.1
	Total	**1,859**	100

- Only 45.1% of the membership fall in the class of Fellow and corporate members.
- The majority of members (50.1%) are graduates still under mentorship
- Technologists and technicians make the least (4.8%). This further means that Degree holders make up over 95% of the membership.

•There is a wide gap between qualified engineers entering the market and those registered. There are much more engineers in the market than those being regulated.
>>>> This imposes a serious risk to the public and casts doubt to the quality of products

The Demand for Engineering

- Three key factors contributed to the rapid economic transformation of emerging economies.
  1. They invested heavily in basic infrastructure,
  2. They nurtured the development of local small and medium-sized enterprises.
  3. Their governments supported, funded and nurtured higher education institutions, academies of engineering and technological sciences, professional engineering and technological associations, and industrial and trade associations.
- There is a correlation between economic development and the number and quality of engineers in a country.
  - In 1970, South Korea had about 6,000 engineering graduates. In 1980, these were increased to 14,000. By 1990, the figure had jumped to about 80,000. In the same years South Korea's GNI per capita was US$ 260, US$ 1,900 and US$ 6,480 respectively and it rose to US$ 27,450 in 2015.
- This data appears to show a direct cause and effect: investment in building a well-qualified and sufficiently large pool of engineers leads to economic development.

The Demand for Engineering in Uganda

- Because of the enormous infrastructure deficits, government has prioritized infrastructure in successive budgets and in the NDPs.
- The estimated cost of the key planned infrastructure during the NDP II period 2015 to 2020 is US$ 8.102 billion averaging US$ 1.157 billion annually approximately an average of 3.7% of GDP (NDPII, 2015).

- The total NDPII estimated costs over the planning period FY2015/16 to 2019/20 is UGX 196,675.6 billion.

- Expenditure in the 5 key infrastructure-intensive sectors of *Energy & Mineral Development*; *Works & Transport; ICT*; *Tourism, Trade & industry* and *Water & Environment* which require direct engineering input take up about UGX 66,642 billion or 34% of total expenditure over the NDPII period.

- The total annual development expenditure over the planning period is estimated to be 20.88% of the GDP.

- Infrastructure needs take up well over 10% of the GDP. This means that in order to achieve the middle income status, about US$ 3.127 billion requiring engineering services is available annually.

Can the Current Engineering capacity meet the demand

- In terms of manpower, two questions need to be examined:
  1. *Are the numbers and skills of Engineering professionals sufficient.*
  2. *Is the distribution of technical skills adequate to drive the economic growth and sustainable development objectives in Uganda*.
- Statistics indicate that developing countries have more medical doctors than engineers, whereas the opposite is true in developed countries.

  >>The reason is obvious: proper infrastructure prevents disease and sickness.

USMID Project, Cluster 1 Batch 1b: Arua, Gulu, Lira

Rehabilitation and upgrading of 7.037 km of urban roads to Asphalt concrete pavement in the Municipalities of Arua, Gulu and Lira. The roads have varying carriageway widths, pedestrian walkways, vehicle parking bays, cyclist lanes, solar street lighting, garbage bins storm water drains and associated road furniture and markings including greening and tree planting.

Project duration: 12 months; project cost: UGX 38,208,374,252 (about US$ 10.8 million) including supervision costs.

Personnel Deployment:

Engineers: 8 Local and 5 Foreign.

Technicians: 33 local and 1 Foreign.

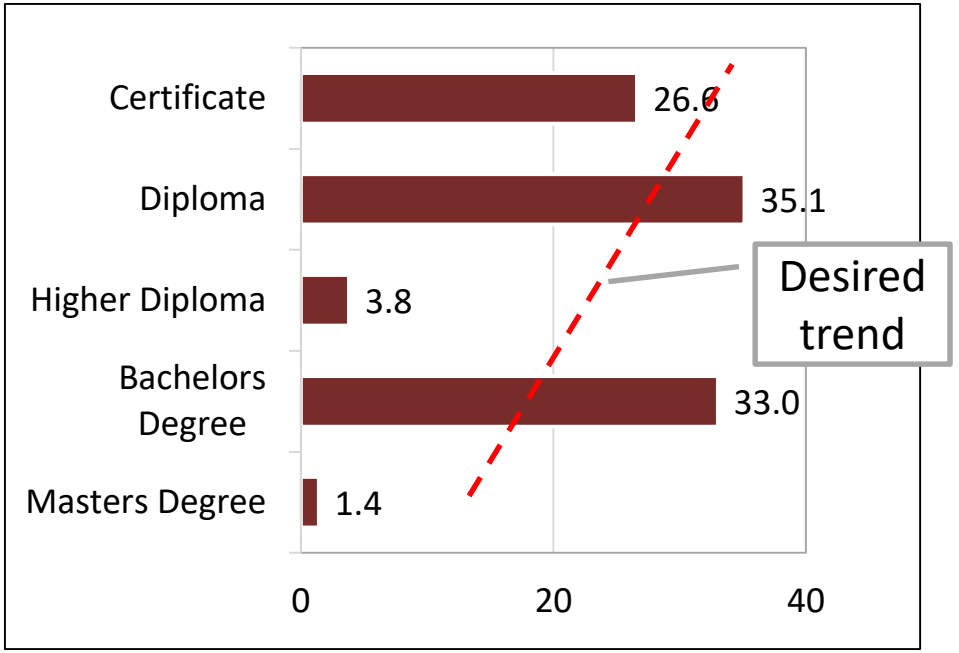
Artisans: 90 Local and 6 Foreign.

Others: 244

Figure Illustration of Manpower deployment for a project under USMID

Key Challenges to Engineering

1. The number of engineers passed out and the skills mix are inadequate.
2. Majority of practicing engineers are not regulated.
3. The procurement process is unnecessarily long and impose so many requirements to the service providers.
4. Limited capacity of local engineering Firms to take up the large infrastructure projects
5. Corruption and Fraud in the Infrastructure Sector
6. Low participation of Engineers to Public Policy



Recommendations

1. Increase the number of engineering professionals. Courses should be more interesting, practical and oriented to skills development. Deliberately target lower qualifications.
2. Government must recognize lower qualifications such as diplomas and certificates in the hierarchy of public service.
3. Make provision for skills training for fresh graduates on public infrastructure projects.
4. Strengthen regulation of professionals. ERB, UIPE and other professional fraternities such as UACE and UNABCEC must be strengthened to play their respective roles in regulation.
5. Carefully embrace the local content policy. Local content policy without deliberate attempts by government to building capacity of local engineering Firms will not achieve its goals.
6. Invest in innovation and relevant research in technology and engineering.
7. Carry out a regular assessment of the state of engineering infrastructure in the country.