ENGINEERING IN THE ECONOMIC TRANSFORMATION OF RWANDA

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Acknowledgment

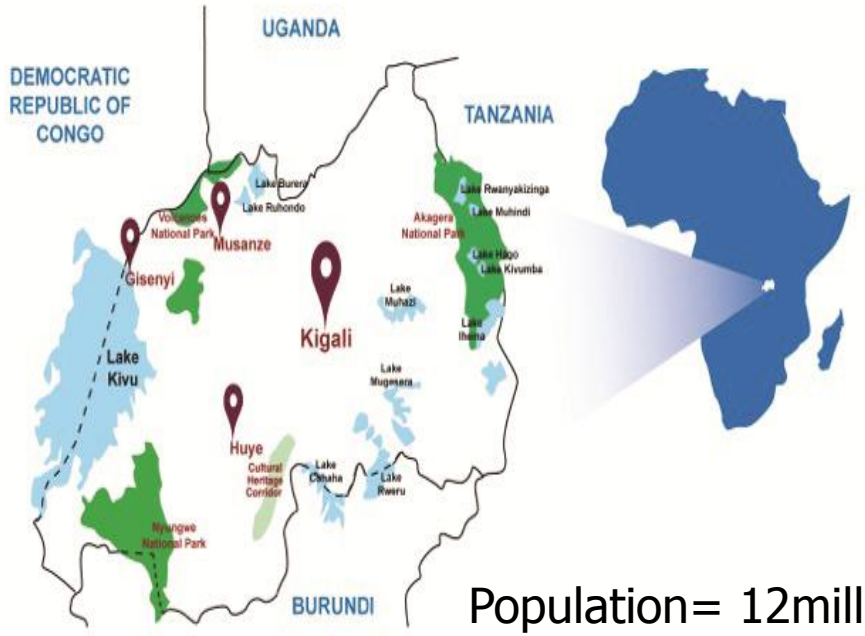
- CAST-CHINA

- IER-RWANDA

Rwanda Location (EAC)

World

Rwanda



East Africa

Population= 12mill (2014)
Area=26,683 Km^2
Language= Kinyarwanda, English & French

Country Highlight (Political Will)

Safety & security	Ease of Doing Business	Corruption
1st in Africa, 9th in the world	**2nd in Africa**	**3rd least corrupt country in Africa**
(WEF Report 2017)	(World Bank Doing Business Report 2017) **(Business Registration only in 6 hrs)**	(Global Corruption Perception Index 2018)

Global Competitiveness	Entry Visa on arrival	Internet
2nd Competitive Country in Africa	All Visitors	**High speed 4G** LTE
(WEF Report 2017-2018)	All Countries	wireless broadband available on public buses in CoK as well

Country Vision in Economic Transformation

Nationals Commitments Plan

- Economic Development and Poverty Reduction Strategy (EDPRS 2) (2013-2018)
- Vision 2020
- National Strategy for Transformation (NST-1) (2018-2024)
- Vision 2050

New global commitments

- Sustainable Development Goals (SDGs) – 2030
- Paris Declaration on Climate Change (2030)
- East African Community (EAC) Vision 2050

Role of Engineering in the Economic Transformation

Economic infrastructure :

- Provide services that are part of the consumption bundle of residents,
- Large-scale expenditures for public works increase aggregate demand and provide short-run stimulus to the economy and
- Serves as an input into private sector production, thus augmenting output and productivity
- Facilitates Trade

Role of Engineering in the Economic Transformation

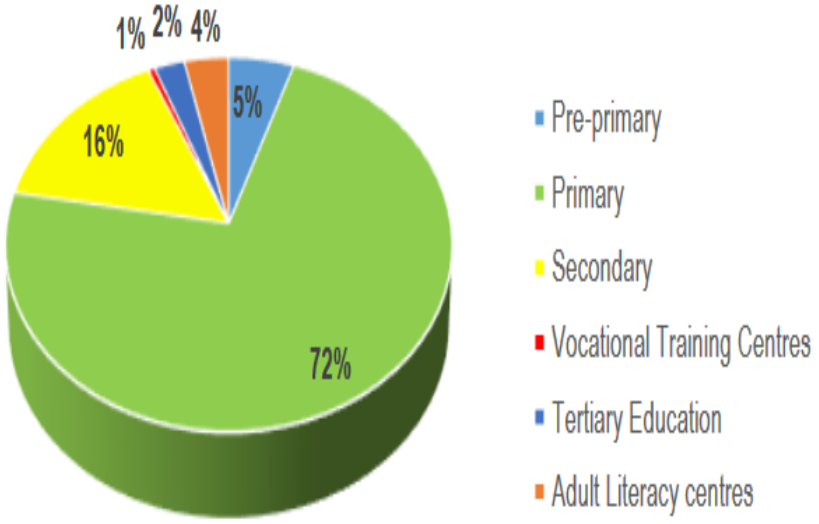
Social infrastructure:

- Engineering education enhances the stock of human capital,
- Human resource development is one of the necessary conditions for all kinds of growth namely social, political, cultural or economic,
- Economic development is not possible without Engineering education and investment in human capital for high productivity,
- Investment in infrastructure is often considered as one of the most effective tools for fighting poverty

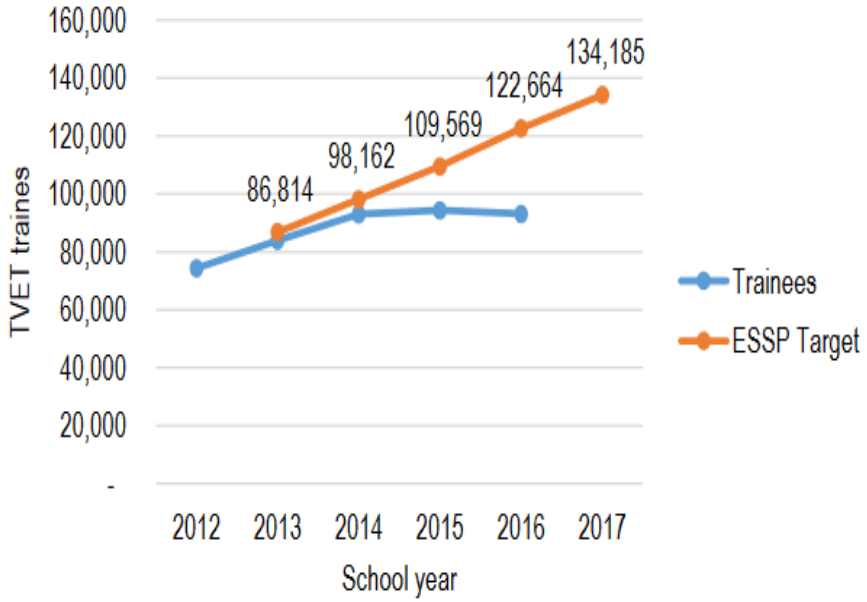
Challenges in Engineering Transformation

- Education Enrolment in Engineering is low (Engineers, Technologists and Technicians)
- Lack of Capacity building (little experience vs needed skills for infrastructure projects (i.e. railway, ports, airports, power plants, etc)
- Low level of Private Participation (local firms, contractors)
- Lack of database on available human resources
- Source of funds for Infrastructure development is 40:60% GoR Vs. Development Partners

Status on Education Enrolment

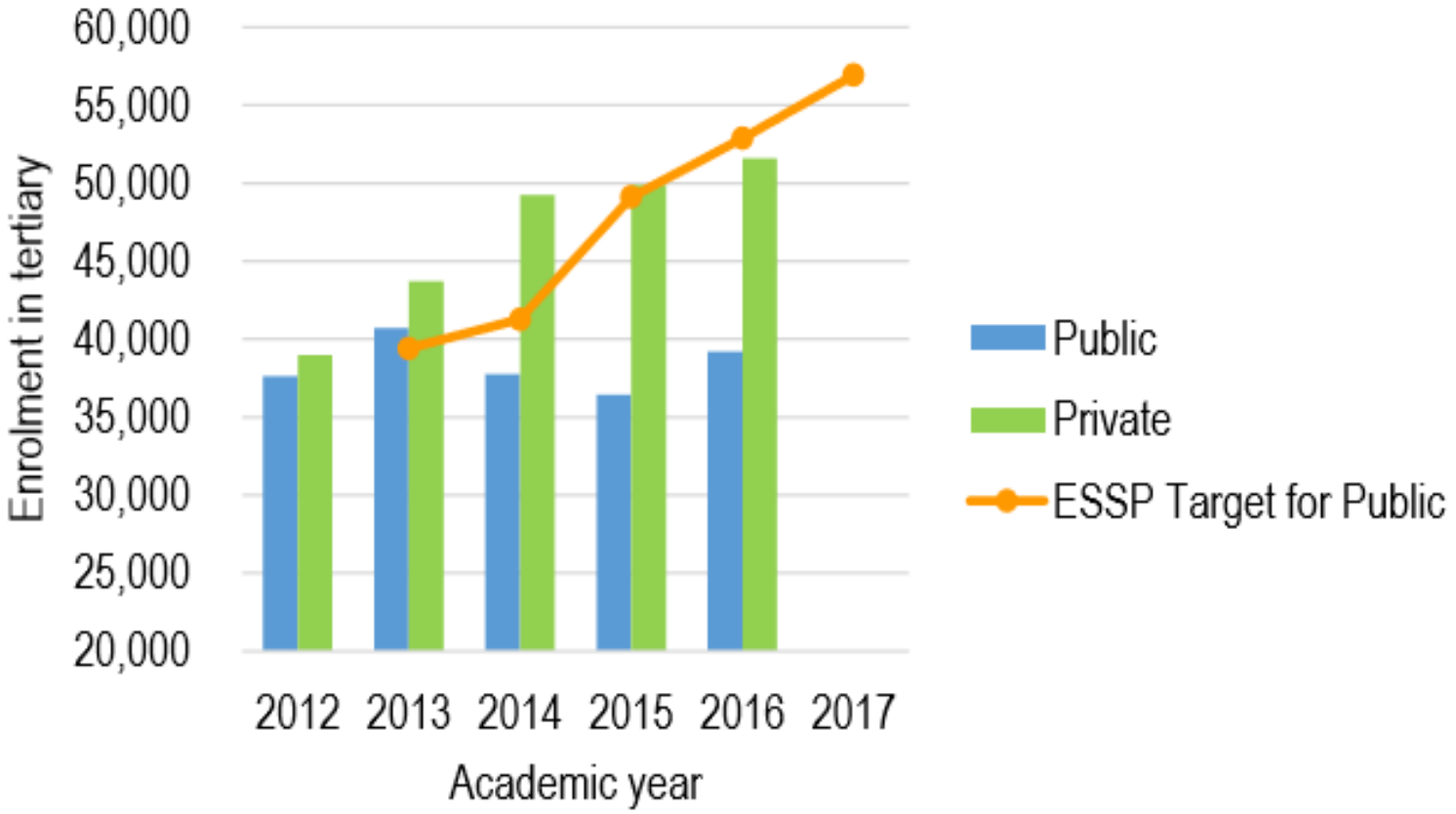


Overall, 2016



Overall TVET, 2016

Status on Education Enrolment



Status of Education Enrolment

- Statistics of education enrolment at University (2016)

Field of education	Number of Students			Percentage by Sex		Percentage by Field of Education		
	Male	Female	Total	Male	Female	Male	Female	Total
Education	7,709	5,059	12,768	60.4%	39.6%	14.7%	13.1%	14.1%
Humanities & Arts	2,014	773	2,787	72.3%	27.7%	3.9%	2.0%	3.1%
Social Science, Business & Law	19,676	21,357	41,033	48.0%	52.0%	37.6%	55.5%	45.2%
Sciences	5,192	2,634	7,826	66.3%	33.7%	9.9%	6.8%	8.6%
Engineering, manufacturing & construction	4,087	1,250	5,337	76.6%	23.4%	7.8%	3.2%	5.9%
Agriculture	2,720	1,380	4,100	66.3%	33.7%	5.2%	3.6%	4.5%
Health & Welfare	3,977	3,985	7,962	49.9%	50.1%	7.6%	10.3%	8.8%
Service	6,922	2,068	8,990	77.0%	23.0%	13.2%	5.4%	9.9%
Total	**52,297**	**38,506**	**90,803**	**57.6%**	**42.4%**	**100%**	**100%**	**100%**

Status of Academic Staff

- Statistics of Academic Staff at the Public University (2016)
  - Most in the Engineering related modules

Qualification	Rwandans		Foreigners		TOTAL			%
	M	F	M	F	M	F	M+F	
PhDs	445	55	124	39	**569**	**94**	**663**	20.2%
Masters	1,267	342	184	47	**1,451**	**389**	**1,840**	56.1%
Bachelors	465	175	13	6	**478**	**181**	**659**	20.1%
Others	67	23	24	5	**91**	**28**	**119**	3.6%
Total	**2,244**	**595**	**345**	**97**	2,589	692	3,281	**100%**

Why Engineering Capacity Building?

Capacity building is a dedication to the strengthening of economies, governments, institutions and individuals through education, training, mentoring, and the infusion of resources.

Capacity building aims at developing secure, stable, and sustainable structures, systems and organizations, with a particular emphasis on using motivation and inspiration for people to improve their lives.

The Quote . . .

"We need to encourage international commitments to promote the kind of engineering and technology that contributes to lasting development around the world."

- Koichiro Matsuura, 2000

Results of Aid to Date

- "The Elusive Quest for Growth", by William Easterly (MIT Press, 2002):
  - *Previous efforts have tried to use foreign aid, ---and giving loans and debt relief conditional on reforms to stimulate the economic growth that would allow these countries to move toward self sufficiency*
  - *all of these efforts over the past few decades have failed to lead to the desired economic growth*
  - *these massive and expensive efforts have failed because they did not hit the fundamental human behavioral chord that "people respond to incentives"*

The Quote…

Russel C. Jones (2017)

"Give a person a fish: you have fed them for today. Teach a person to fish: you have fed them for a lifetime."

And: teach them how to process and package fish for export, and you have stimulated economic development.

What Would Work?

- Easterly argues that there are two areas that can likely lead to the desired economic growth in developing countries, that can lead them toward economic self sufficiency:
  - utilization of advanced technologies, and
  - education that leads to high skills in technological areas

Upgrading engineering education for sustainable transformation

- Need to update curricula and learning approaches
  - Emphasis on advanced technologies such as use of ICT in engineering practice (e.g., CAD)
  - Development of "soft skills" (communications, teamwork, global focus, entrepreneurship, etc.)
  - Utilization of modern learning methods (e.g., active and collaborative learning, computer enhanced instruction, project based learning)
  - Quality assurance (outcomes assessment, accreditation approaching Washington Accord quality level)

What outcomes are desired?

- A solid base of technologically prepared Engineers in developing countries
  - to attract investments by multinational companies
  - to assist in making the most of foreign aid funds, in address infrastructure needs
  - to provide a basis for business development by local engineers

Current Rwanda-China Protocol

- The first economic and technological cooperation was signed in 1972
- The outcome was China providing assistance to Rwanda in the form of
  - Infrastructure projects,
  - Technical and public health assistance, and
  - Scholarships for Studying in China
- The efforts, were lacking local capacity building

Next steps CAST-IER initiatives

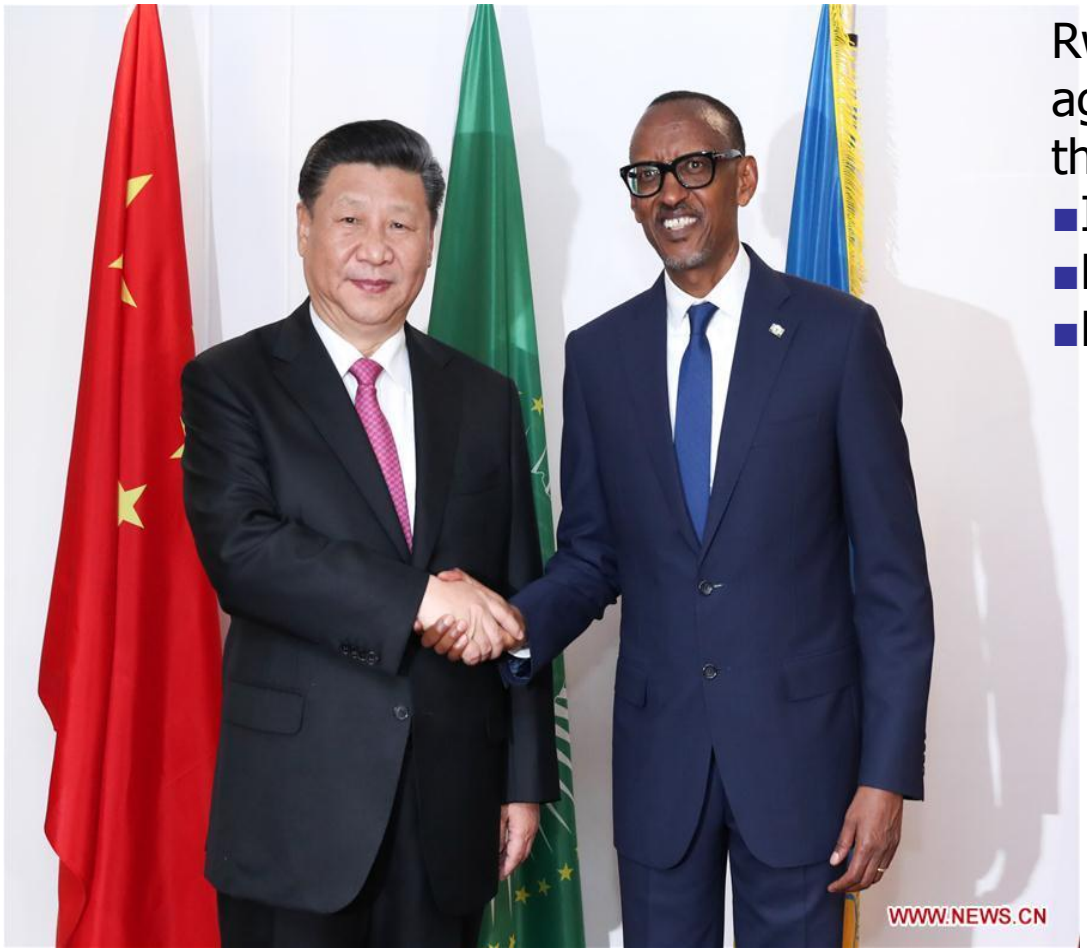
Developing frameworks for;

- Engineering education through webinar
- Continuous professional development training
- Stimulation of internship programs
- Young and Women Engineers exchanges
- Incubators for innovations

Next steps CAST-IER initiatives

- To Enhance Knowledge sharing and capacity building on Selected SDGs focus by IER

Accord of 2018



Rwanda, China bilateral agreements 31, July 2018 during the visit of HE, President of China

- Infrastructure Development
- E-Commerce
- Human resources development

Thanks