ENGINEERING IN THE ECONOMIC TRANSFORMATION OF RWANDA

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Acknowledgment

- CAST-CHINA
- IER-RWANDA
Rwanda Location (EAC)

Population= 12mill (2014)
Area= 26,683 Km²
Language= Kinyarwanda, English & French
## Country Highlight (Political Will)

<table>
<thead>
<tr>
<th>Safety &amp; security</th>
<th>Ease of Doing Business</th>
<th>Corruption</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st in Africa, 9th in the world</td>
<td>2nd in Africa</td>
<td>3rd least corrupt country in Africa</td>
</tr>
<tr>
<td>(Business Registration only in 6 hrs)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Global Competitiveness

<table>
<thead>
<tr>
<th>Entry Visa on arrival</th>
<th>Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Visitors</td>
<td>High speed 4G LTE</td>
</tr>
<tr>
<td>All Countries</td>
<td>wireless broadband available on public buses in CoK as well</td>
</tr>
</tbody>
</table>

(WEF Report 2017-2018)
Country Vision in Economic Transformation

Nationals Commitments Plan

- Vision 2020
- 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

Pie chart showing the distribution of enrolment:
- Pre-primary: 16%
- Primary: 72%
- Secondary: 4%
- Vocational Training Centres: 2%
- Tertiary Education: 1%
- Adult Literacy centres: 5%

Overall TVET, 2016

Line graph showing the trend of TVET trainees from 2012 to 2017:
- 2012: 86,814
- 2013: 98,162
- 2014: 109,569
- 2015: 122,664
- 2016: 134,185

The graph also shows the ESSP Target, which is not explicitly shown in the image.
Status on Education Enrolment

[Graph showing enrolment in tertiary education over years 2012 to 2017, with bars for public and private sectors, and a line indicating ESSP Target for Public]
## Status of Education Enrolment

### Statistics of education enrolment at University (2016)

<table>
<thead>
<tr>
<th>Field of education</th>
<th>Number of Students</th>
<th>Percentage by Sex</th>
<th>Percentage by Field of Education</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
</tr>
<tr>
<td>Education</td>
<td>7,709</td>
<td>5,059</td>
<td>12,768</td>
</tr>
<tr>
<td>Humanities &amp; Arts</td>
<td>2,014</td>
<td>773</td>
<td>2,787</td>
</tr>
<tr>
<td>Social Science, Business &amp; Law</td>
<td>19,676</td>
<td>21,357</td>
<td>41,033</td>
</tr>
<tr>
<td>Sciences</td>
<td>5,192</td>
<td>2,634</td>
<td>7,826</td>
</tr>
<tr>
<td><strong>Engineering, manufacturing &amp; construction</strong></td>
<td>4,087</td>
<td>1,250</td>
<td>5,337</td>
</tr>
<tr>
<td>Agriculture</td>
<td>2,720</td>
<td>1,380</td>
<td>4,100</td>
</tr>
<tr>
<td>Health &amp; Welfare</td>
<td>3,977</td>
<td>3,985</td>
<td>7,962</td>
</tr>
<tr>
<td>Service</td>
<td>6,922</td>
<td>2,068</td>
<td>8,990</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>52,297</td>
<td>38,506</td>
<td>90,803</td>
</tr>
</tbody>
</table>
### Status of Academic Staff

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

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

- 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.
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
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

Meet in Remarkable Rwanda