Global Innovation Index
Winning with Global Innovation

GII 2016: UGANDA

PROGRAM FOR INNOVATION AND ECONOMIC GROWTH SEMINAR, 2016

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The Global Innovation Index 2016
Winning with Global Innovation

1. Introduction to the Global Innovation Index
2. Main findings of GII 2016
3. Sub-Saharan Africa and Uganda in the GII 2016
4. Conclusion and Key messages
Introduction to the Global Innovation Index

- Measures innovation across more than 128 economies
- Leading reference on innovation
- A ‘tool for action’ for decision makers with the goal of improving countries’ innovation performances

- An inclusive view of innovation, applicable to both developed and emerging economies alike
- A holistic view of innovation
Impact and responsibility

The UN Secretary-General stressed that the GII is:

- ‘a unique tool for refining innovation policies …’ and
- ‘for assessing where more efforts are urgently needed’
The GII - mirroring an innovation ecosystem

Global Innovation Index (average)

Innovation Efficiency Ratio (ratio)

Innovation Input Sub-Index

Institutions
- Political environment
- Regulatory environment
- Business environment

Human capital and research
- Education
- Tertiary education
- Research & development

Infrastructure
- ICTs
- General infrastructure
- Ecological sustainability

Market sophistication
- Credit
- Investment
- Trade, competition, & market scale

Business sophistication
- Knowledge workers
- Innovation linkages
- Knowledge absorption

Innovation Output Sub-Index

Knowledge and technology outputs
- Knowledge creation
- Knowledge impact
- Knowledge diffusion

Creative outputs
- Intangible assets
- Creative goods and services
- Online creativity
The GII rankings are not the whole story

- The GII helps identify targeted policies, good practices, and other levers to foster innovation.
- Country profiles include strengths and weaknesses.
- The GII rankings attract media attention, but they are not the main part of the GII.
- Major demand pull for data

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Major demand pull for data.
(1) LEVERAGING GLOBAL INNOVATION to avoid a continued low-growth scenario

- Investments in R&D and innovation are central for economic growth

- More efforts are needed to return to pre-crisis R&D growth levels

- How to more systematically spread R&D to low- and middle-income economies
  - cannot rely on China driving global growth alone – basic R&D

- Progress accumulated can vanish quickly
Global Innovation Networks offer unseen possibilities for catch-up
- Some few developing countries are outperforming on innovation inputs and outputs relative to GDP

At same time competition is fierce, factors mobile, and risks of “being left behind”
- Technology adoption alone is no longer sufficient
(2) INNOVATION IS BECOMING MORE GLOBAL BUT DIVIDES REMAIN

Highly developed innovation nations lead – core clusters dominate high-quality outputs

Only a handful of countries catching-up (Korea, China,)
  - Manufacturing / assembly role
  - Large emerging multinationals
  - Port or Services hub (Singapore)

Other layers focusing on core competences and niches
  - Leveraging domestic riches
  - Expanding to new sectors (software, finance) but needs to be area that can be scaled up and exported
There are 15 countries out-performing their peers relative to GDP per capita: Armenia, Czech Republic, India, Kenya, Republic of Moldova, Madagascar, Malta, Mozambique, Malawi, Portugal, Rwanda, Tajikistan, Uganda, Ukraine, and Viet Nam.
Factors reinforcing learning

• Ability of domestic firms and laboratories to learn and adapt technology is critical.

• Openness to trade, FDI and IP licensing

• Diffusion ("spillovers") depend positively on:
  • Absorptive capacity
  • Competitive processes (easy entry);
  • Extent of potential backward linkages;

• Institutions for linking public research and market commercialization of new goods and technologies.
Sub-Saharan Africa and Uganda in the GII 2016

SUB-SAHARAN AFRICA: IMPORTANT TO PRESERVE MOMENTUM in face of economic downturn

Innovation in the region is neither uniform across all economies nor is future success guaranteed.

As economic slowdown occurs, it will be important for Africa to preserve its current innovation momentum and to continue moving away from relying on oil/commodity revenues.

Highest number of innovation achievers since 2012: Mozambique, Rwanda, Malawi, Kenya, Uganda, and Madagascar
Sub-Saharan Africa and Uganda in the GII 2016

Africa Innovation System

- Low level of science and technology activity (S&T)
- Government or foreign donors as source of R&D
- Limited science-industry linkages
- Challenging Business Environment
- Low absorptive capacity of firms
- Retain and foster new talent
- Limited use of IP
Success from improved institutions, better business environment (including financial market and FDI), and explicit science and innovation policy.

Has allowed Africa to catch up to Central and Southern Asia, and to overtake Northern Africa and Western Asia.

Led by economies such as Botswana, Mauritius, Rwanda, and South Africa, SSA shows highest scores in institutions and in Market sophistication.

Larger economies, such as Botswana and Namibia, show strong performance in General infrastructure and Ecological sustainability.
Typical innovation leader in Africa

- Strong investment and growth rate
- Growing expenditure on education and R&D, % GDP
- Strong financial market indicators (VC)
- Openness to technology adoption and inward flows
- Improving science and research base
- Strength in ICT and business model innovation
- Often paired with financial component
- Incipient and stronger use of the IP system
Innovation is more impactful and pervasive in Africa than R&D data suggests – Can it be scaled up?

Context-specific solutions for local challenges

1. Peer to peer lending - Lab of Financial Inclusion Kenya with MasterCard and foundation
2. Agriculture often not captured
3. Innovation in the informal economy

Informal economy: Kenya

Informal Innovation and Constrained entrepreneurship
Sub-Saharan Africa – Uganda and the GII 2016

- **99th globally** in the GII 2016
  - CI between 96th and 108th.
- **91st** in the Innovation Input Sub-Index
- **105th** in the Innovation Output Sub-Index
- **5th** among low income economies

| Years Uganda has been identified as an Innovation achiever and Pillar outperformer |
|---------------------------------|---------------------------------|
| Innovation achiever            | Pillar outperformer             |

- Excellent data coverage, with lots of outdated data points though, and a few subpillars with misleading results due to missing data.
  - See General Infrastructure 3.2 or 7.2 where result based on too few datapoints.
Uganda: A profile with pillars outperforming overall performance

- Creative outputs: 107
- Market sophistication: 107
- Human capital and research: 102
- Global Innovation Index: 99
- Knowledge & technology outputs: 92
- Institutions: 85
- Infrastructure: 83
- Business sophistication: 61

GII 2016 Rank
Uganda: GII 2016 Strengths

- **Business sophistication (61st):** Innovation linkages (16th)
- **Institutions (85th):** Regulatory environment (61st)
- **Strengths in sub-pillar Knowledge absorption (45th)**
- **On Innovation Inputs:** a strength is also found in Tertiary education (82nd)
  - Tertiary inbound mobility (12th).
- **On Innovation outputs:** a strength in Knowledge diffusion (107th)
  - Intellectual property receipts (32nd)
  - At the variable level, its top strengths are in Gross capital formation (10th) and GERD financed by abroad (3rd).
Uganda: GII 2016 Strong Pillars

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<thead>
<tr>
<th>5</th>
<th>Business sophistication</th>
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<tbody>
<tr>
<td>5.1</td>
<td>Knowledge workers</td>
<td>31.9</td>
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<tr>
<td>5.1.1</td>
<td>Knowledge-intensive employment, %</td>
<td>17.7</td>
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<tr>
<td>5.1.2</td>
<td>Firms offering formal training, %</td>
<td>4.1</td>
<td>101</td>
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<tr>
<td>5.1.3</td>
<td>GERD performed by business, % of GDP</td>
<td>34.7</td>
<td>45</td>
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<td>5.1.4</td>
<td>GERD financed by business, %</td>
<td>0.2</td>
<td>55</td>
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<tr>
<td>5.1.5</td>
<td>Females employed w/advanced degrees, %</td>
<td>13.7</td>
<td>67</td>
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<table>
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<th>Innovation linkages</th>
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<tr>
<td>5.2.1</td>
<td>University/industry research collaboration</td>
<td>44.7</td>
<td>60</td>
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<tr>
<td>5.2.2</td>
<td>State of cluster development</td>
<td>41.5</td>
<td>81</td>
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<tr>
<td>5.2.3</td>
<td>GERD financed by abroad, %</td>
<td>57.3</td>
<td>3</td>
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<tr>
<td>5.2.4</td>
<td>JV–strategic alliance deals/bn PPP$ GDP</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>5.2.5</td>
<td>Patent families 2+ offices/bn PPP$ GDP</td>
<td>0.0</td>
<td>89</td>
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<tr>
<th>5.3</th>
<th>Knowledge absorption</th>
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<th>32.3</th>
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<tr>
<td>5.3.1</td>
<td>Intellectual property payments, % total trade</td>
<td>0.2</td>
<td>83</td>
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<td>5.3.2</td>
<td>High-tech imports less re-imports, % total trade</td>
<td>6.2</td>
<td>77</td>
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<tr>
<td>5.3.3</td>
<td>ICT services imports, % total trade</td>
<td>1.2</td>
<td>54</td>
</tr>
<tr>
<td>5.3.4</td>
<td>FDI net inflows, % GDP</td>
<td>4.2</td>
<td>38</td>
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<tr>
<td>5.3.5</td>
<td>Research talent, % in business enterprise (%</td>
<td>50.6</td>
<td>23</td>
</tr>
</tbody>
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Some of the most challenging variables for sound innovation system are looking good.
**Uganda: GII 2016 Weakness**

- Relative GII weaknesses on the Innovation Input side are mostly accumulated in the pillar of Human capital and research (102\textsuperscript{nd}).
  - Uganda exhibits weakness in the indicators Expenditure on education (112\textsuperscript{th}), Tertiary enrolment (115\textsuperscript{th}), and QS university ranking (73\textsuperscript{rd}).
  - Other weaknesses on Innovation Input side, at the variable level, are found in ICT access (120\textsuperscript{th}), E-participation (120\textsuperscript{th}), Total value of stocks traded (81\textsuperscript{st}), and Knowledge-intensive employment (101\textsuperscript{st}).

- On Innovation Output side, relative weaknesses are demonstrated in Creative outputs (107\textsuperscript{th}).

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<thead>
<tr>
<th></th>
<th>Infrastructure</th>
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<tr>
<td>3.1</td>
<td>Information &amp; communication technologies (ICTs)</td>
<td>15.8</td>
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<tr>
<td>3.1.1</td>
<td>ICT access*</td>
<td>23.5</td>
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<td>3.1.2</td>
<td>ICT use*</td>
<td>11.0</td>
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<tr>
<td>3.1.3</td>
<td>Government’s online service*</td>
<td>15.0</td>
<td>116</td>
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<tr>
<td>3.1.4</td>
<td>E-participation*</td>
<td>13.7</td>
<td>120 O</td>
</tr>
<tr>
<td>Section</td>
<td>Indicator Description</td>
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<tr>
<td>2</td>
<td>Human capital &amp; research</td>
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<tr>
<td>2.1</td>
<td>Education</td>
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<td>2.1.1</td>
<td>Expenditure on education, % GDP</td>
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<td>2.1.2</td>
<td>Gov't expenditure/pupil, secondary, % GDP/cap</td>
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<tr>
<td>2.1.3</td>
<td>School life expectancy, years</td>
<td></td>
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<tr>
<td>2.1.4</td>
<td>PISA scales in reading, maths, &amp; science</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>2.1.5</td>
<td>Pupil-teacher ratio, secondary</td>
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<td>2.2</td>
<td>Tertiary education</td>
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<tr>
<td>2.2.1</td>
<td>Tertiary enrolment, % gross</td>
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<tr>
<td>2.2.2</td>
<td>Graduates in science &amp; engineering, %</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>2.2.3</td>
<td>Tertiary Inbound mobility, %</td>
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<tr>
<td>2.3</td>
<td>Research &amp; development (R&amp;D)</td>
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<tr>
<td>2.3.1</td>
<td>Researchers, FTE/mn pop.</td>
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<tr>
<td>2.3.2</td>
<td>Gross expenditure on R&amp;D, % GDP</td>
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<tr>
<td>2.3.3</td>
<td>Global R&amp;D companies, avg. expend. top 3, mn $US</td>
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<tr>
<td>2.3.4</td>
<td>QS university ranking, average score top 3*</td>
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<tr>
<td>6.1.4</td>
<td>Scientific &amp; technical articles/bn PPP$ GDP</td>
<td></td>
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<tr>
<td>6.1.5</td>
<td>Citable documents H index</td>
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### Sub-Saharan Africa – Uganda and the GII 2016

#### Knowledge & technology outputs

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</thead>
<tbody>
<tr>
<td>6.1.1</td>
<td>Patents by origin/bn PPP$ GDP</td>
<td>0.1</td>
<td>109</td>
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<tr>
<td>6.1.2</td>
<td>PCT patent applications/bn PPP$ GDP</td>
<td>0.1</td>
<td>75</td>
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<td>6.1.3</td>
<td>Utility models by origin/bn PPP$ GDP</td>
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#### Creative outputs

<table>
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<tr>
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<tr>
<td>7.1.1</td>
<td>Trademarks by origin/bn PPP$ GDP</td>
<td>14.3</td>
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<tr>
<td>7.1.2</td>
<td>Industrial designs by origin/bn PPP$ GDP</td>
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<td>n/a</td>
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#### Knowledge diffusion

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<th>Section</th>
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</thead>
<tbody>
<tr>
<td>6.3.1</td>
<td>Intellectual property receipts, % total trade</td>
<td>0.2</td>
<td>32</td>
</tr>
</tbody>
</table>

### Question

- What is the rank for Trademarks by origin/bn PPP$ GDP?
Formal intellectual property rights are relatively infrequently tapped in Uganda.
Total patent applications in Uganda

**Total Patent Applications**

- Year: 2000 to 2014
- No. of Patent Applications: 0 to 14

**Total Patent Grants**

- Year: 2000 to 2014
- No. of Patent Granted: 0 to 2.5

**Source:** WIPO Statistics database, 2015
Conclusion and Key messages

• Overcome ICT access issues
• Reinvigorate innovation system with increased expenditure on education, recalibration of tertiary education
• Scale up impact of good R&D and university linkages...
• Maximize impact of foreign linkages, FDI and donors
• Increase knowledge-intensive employment
• Build intellectual capital and IP...

• Continue innovation policy process of developing a strategy by involving stakeholders...with smart, IP policies

Implementing the strategies with measurable targets and staying the course
Thank you for your attention

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