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# **Presentation**

## **Emerging technologies and the SDGs**

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# The SDGs and the Global Challenge

- The preamble to the UN General Assembly resolution for the SDGs began with these emotive words:

“We recognize that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development.”

“As we embark on this collective journey, we pledge that **no one will be left behind.** (UN General Assembly, 25 September 2015)

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# Technology and paths to industrial development in Sub-Saharan Africa (SSA)

- A large share of Africa's population risk being left behind
    - 60% of the world's extreme poverty (< \$1.90/day) (FAO)
    - Extreme poverty concentrated heavily in rural areas amongst populations with high dependence on agriculture including subsistence agriculture.
  - There are no examples of nations that have achieved sustained prosperity and a decent standard of living for their citizens without a robust industrial sector
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# Promises and challenges of emerging technologies in Africa: Setting the stage (1)

- One of the big challenges most African nations face is that exports of relatively low value added primary products dominate their intermediate exports. As African nations' participation in global value chains (GVCs) is largely confined to low value added primary inputs, possibilities for learning and upgrading within GVCs are likely to be limited (McGregor et al. 2016).
  - At the same time, natural resource abundance implies that agro-industry development provides an important path to industrialization in Africa. Agro-industry should be widely defined to include food and beverages, paper and wood products, textiles, footwear and apparel, leather products, and rubber products.
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## Setting the stage (2): micro and small firms

- Micro and small firms (MSEs) account for the majority of non-agricultural employment in Sub-Saharan Africa. They are sources of diversity and complementarity in industrialization and they provide needed job opportunities for Africa's burgeoning youth.
  - Micro and small enterprises have demonstrated their innovative potential but they are severely credit constrained. Africa's shallow financial systems lack the breadth to meet the liquidity demand of a large share of enterprises, and especially those of micro and small firms.
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# Financial constraints on micro and small firm development

## World Bank Enterprise Survey: Share of Registered Enterprises that are Credit Constrained

	Micro and small < 20 employees	Medium 20-99 employees	Large > 99 employees
Nigeria	70.3	50.3	21.1
Tanzania	72.1	51.1	5.8
Uganda	57.3	40.4	25.9
South Africa	40.5	20.6	9.9

## Setting the stage (3): gaps in infrastructure

- Weak and uneven development of infrastructure in energy, transport, and communications contributes directly to Africa's low level of productivity and industry's low and in some cases declining contribution to GDP.
- Only 30% of Africa's population has access to electricity, compared to 70-90% in other parts of the developing world. The road access rate in Africa is only 34%, compared with 50% in other parts of the developing world, while transport costs are estimated to be 100% higher. Weak infrastructure has been estimated to slow economic growth by 2% annually (PIDA, 2012)

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# How can emerging technologies promote industrialization in Africa?

- There is a need for affordable technologies and scalable solutions adopted to the needs of small-scale producers both in agriculture and industry who face big constraints in terms of access to credit and often face daunting infrastructural challenges.
  - Emerging technologies can contribute to both agricultural transformation and to industrialization through supporting upgrading within local or regional agro-industry value chains.
  - Emerging technologies need to address sustainable solutions for infrastructure adapted to the realities of the African setting. Infrastructural development may create spin-off opportunities for skills development and local job creation/entrepreneurship both in business services and in manufacturing.
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# Satellite-based ICT for improved crop production in the Gezira Irrigation Scheme, Sudan

- Bottom-up and top-down approach
    - Financed by the Technical Centre for Agricultural and Rural Cooperation (CTA) and implementation by the Hydraulic Research Centre (HRC) in Sudan
    - 44 smallholders (3 to 4 hectares) in pilot project
  - Satellite imagery in combination with meteorological data and field assessments to provide irrigation advice assessed via SMS delivery (no need for smart phones)
  - The pilot farmers experienced an average 60% increase in their wheat yields, as well as improvements in water-use efficiency.
  - Scalable: Farmers have expressed a willingness to pay for services which could support their extension to a larger share of the region's 140,000 smallholders
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# ICTs for inclusive agro-industry value chain development: in search of good practice

- **Dunavant Zambia** uses a supply chain management and electronic payment system that it developed jointly with IT company Mobile Transactions Zambia Limited (MTZL) to reduce transaction costs and improve information flows Throughout its cotton supply chain, from input distribution to cotton gin inventory control
  - **Homegrown**, a Kenyan agribusiness company with a network of more than 1,000 out growers, uses Quick-fire, an audit management software created by ICT company Muddy Boots to help its out growers meet export market standards by ensuring farms supplying the produce are all audited and certified
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# Biosciences: potential for inclusive value chain development through science/industry links

- **Bio-resources innovation network** is headed up by Julius Ecuru in Nairobi. Aims to exploit radical advances in biosciences as a basis for innovations for a) value addition to agro produce and creation of agribusiness opportunities, b) agro/biowaste conversion in support of climate change mitigation and environmental sustainability and c) development of policies that foster bioscience innovations in the region.
    - Development and introduction disease resistant canning bean varieties in Kenya, Tanzania and Ethiopia in collaboration with the private bean canning industry
    - Turning factory waste in biogas: pilot facility at Modjo Tannery Ltd converting organic elements in wastewater into biogas.
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## Emerging technologies for sustainable energy: building on transport corridors

- There are several large-scale renewable energy projects, (wind and solar) that are designed to extend national grids
  - Examples. Lake Turkana, Kenya (310 MW); Tarfaya, Morocco (300 MW); Ashegoda, Ethiopia (120 MW)
  - The existing transport corridors could be used as the skeleton for making extensions to the grids and for greater regional infrastructural integration (see ECA)
  - There is scope for smart grid technologies given that the national grids are incomplete to a significant degree. There is opportunity for stage skipping or leapfrogging in the development of sustainable energy systems.
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# Renewable energy: bottom-up initiatives

- Stand alone and mini-grids for renewable solar energy
    - Growing private market in East African in the area of stand alone solar energy systems for home and small business use
    - Growth in private sector entrepreneurship for installation and business services
  - Linked to PAYG mobile money business model for stand alones
    - Start-ups in East Africa: M-KOPA, Mobisol, Off-Grid
  - Unexploited potential for backward linkages into manufacturing
    - Ubbik East Africa, a joint venture in Kenya for solar panel production; SPS located near Accra in Ghana; ARTSolar in Durban, SA
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# Conclusions: exploiting windows of opportunity

- I have highlighted a few areas where disruptive or emerging technologies are creating windows of opportunity for industrial development in Africa
  - There's a need to develop technologies for up-grading in regional value chain as a basis for the development of an indigenous industrial capacity in agro-industry
  - Attention to the infrastructure/industrialization nexus and focus on sustainable energy solutions including off-grid solar and biogas.
    - Forward linkages to knowledge intensive business services (mobile money and finance)
    - Unexploited potential for backward linkages to manufacturing capacity development
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# Conclusions: creating windows of opportunity

- The need for appropriate policies and regulatory environments
    - For example standard PPA templates for mini grids
  - The need for financial solutions big and small
    - Extend inclusive finance based on mobile money platforms
    - Government backing for large scale finance in renewables including manufacturing capacity.
  - The need for greater African regional economic integration
    - In trade to increase intra-regional trade in support of regional value chain development.
    - In infrastructure
    - In mobility of people and talent
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