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DST-NRF Centre of Excellence in
Scientometrics and Science,
Technology and Innovation Policy

Science, technology and innovation policy for Africa: Measurement and indicators

Fred Gault

UNU-MERIT and TUT-IERI

Second AfricaLics International Conference

Unpacking systems of innovation for sustainable development in Africa

Kigali, Rwanda, November 17-19, 2015



DST-NRF Centre of Excellence in
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Innovation/Systems/Policy/**Learning**

Innovation according to the Oslo Manual

- Innovation is about putting new or significantly improved products (goods or services) on the market or finding better ways of getting them there*.
- Better ways include:
 - Processes for transformation of inputs to outputs and delivery of product
 - Organizational change or the use of business practices
 - Market development or the finding of new markets.
- Firms innovate
 - More firms innovate than do research and development (R&D)
 - Innovative firms are widely distributed –
 - R&D performers are concentrated in a few countries, in a few industries in those countries and in a few firms in those industries. Measurement is different for innovation and for R&D

*paraphrase of para 146 and 150 of OECD/Eurostat (2005), the Oslo Manual

Innovation systems

- Actors
 - Governments, education and research institutions, firms, ...
- Activities
 - R&D, invention, capital expenditure. diffusion of technologies and practices, design, HR development
- **Linkages**
 - Collaborations, contracts, co-publications, grants and monitoring, ...
- Outcomes
 - Jobs, growth, productivity, sustainability, inclusion, greater equity, ...
- Impacts
 - Wellbeing, culture change, global influence, ...
- The **system** is complex, dynamic, non-linear in response to policy intervention, and global. The system has several time scales. It is also context dependent: Rwanda is not the same as other countries

Innovation policy

- Policy approaches
 - Innovators (firms)
 - Regional
 - Sectoral
 - Technologies or practices
 - Linkages
 - Flows between institutions of energy, materiel, people, data, information and knowledge, technologies and practices ...
 - Framework conditions
 - Short term (one mandate)
 - Longer term (more than one mandate)
 - Unexpected/uncontrolled events

Building an innovation policy

- **Key questions**

- Purpose and targets (problems to be solved)
 - Jobs and growth, **sustainability**, equity, inclusiveness, ...
- Scope
 - Sector, region, technology, science, innovation ... policy, framework conditions, ...?
 - Mix of these and more?
- Components
 - Few? Some? Many? Or, stepwise approach with several steps
- Consultation and collaboration
 - Input from the **private sector**, international organizations, civil society, higher education and research institutes...
- Governance
 - At what level(s)? Whole of government?

- **Key questions guide evaluation**

Components for a policy - 1

- Markets
 - Brand recognition
 - Lead market
 - Competitive engagement
 - Financial services
- Framework Conditions
- People
 - Labour force
 - Both highly skilled and less skilled
 - Demographics and demand for innovation – median age? (19)
 - Migration, Diaspora
- Innovation activities
 - Technology and practices
 - Open, user and demand-driven innovation
 - Supply-driven innovation
- International engagement
 - Big science (Climate change observatory)
 - International co-operation and development (International Center for Theoretical Physics – EAC)
 - Global challenges
- Public Sector? → Next

Components for a policy - 2

- Public Institutions

- Infrastructure
- Procurement
- Priority setting
- Standard setting
- Public finance
 - Development banks, trade support, ...
- Government departments
 - Including granting councils
 - Knowledge and technology transfer

- Education

- All levels
- Training and life-long learning
- Research – HQP production
- Capacity building

- Migration

- Immigration policy
- Foreign experience

- Health

- Nutrition
- Wellness
- Disease control

- **Monitoring and evaluation**

- **Policy learning and change**

Implementing innovation policy

- Select the components
- Agree on governance level
- Produce any needed legislation
- Create and use the policy instruments
- **Monitor** and **Evaluate** the results
- Engage in policy **learning** and **change** the approach

“Important aspects of STI policy development such as **monitoring** and **evaluation** are not budgeted for (and thus not resourced ...)”
STISA p16.

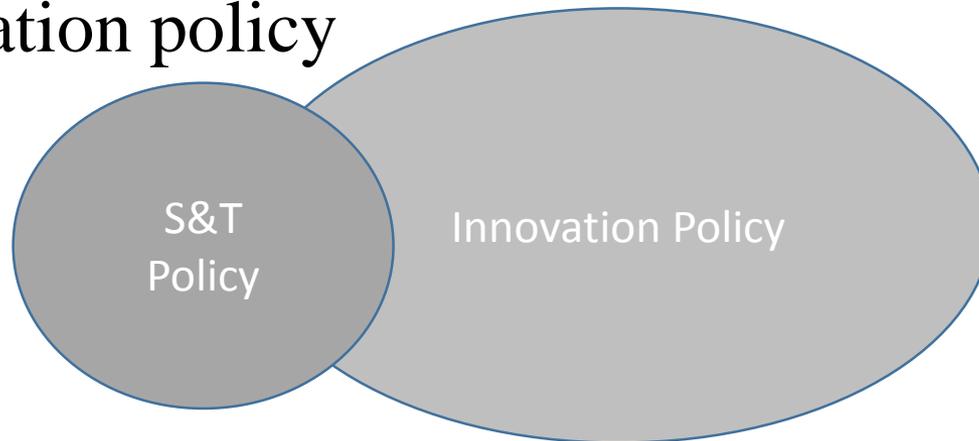
Innovation policy sources

- OECD and the World Bank have created the Innovation Policy Platform (IPP). Look at <https://www.innovationpolicyplatform.org/> and see what countries are doing with innovation policy
- UNESCO has established the Global Observatory of STI Policy Instruments (GO-SPIN). Surveys are conducted and in Africa this is in collaboration with AOSTI. Case studies on Botswana, Zimbabwe, Malawi and **Rwanda** are published
- AOSTI Working Paper No. 2 - Science, Technology and Innovation Policy-Making in Africa: An Assessment of Capacity Needs and Priorities
- ASTII African Innovation Outlook II – Chapter 2

Innovation Policy and S&T Policy

Innovation Policy and S&T Policy

- Science and technology policy is **not** a subset of innovation policy



- Time scales are different, institutions are different and the culture is different
- There is overlap

S&T Policy

- Generation of knowledge
 - Tacit (known by researchers – or community) and codified (publications)
 - Formal generation of knowledge is R&D (OECD 2015)
- Human resources development
- Development of new technologies and practices
 - Materials, bio, nano, ICTs, networks,
- Part of S&T policy is to support knowledge generation and HR development in all sectors – HE, government research institutes, the private sector...
- S&T policy goes beyond R&D expenditure and researchers. (GERD/GDP is a limited indicator)

S&T Policy

- Support for knowledge generation
 - Support for the science system
 - Grants and contracts
 - Tax benefits for R&D, training, capital investment
 - Procurement
 - Support agencies (SBIR <http://www.sbir.gov/#>)
- Commercialization and knowledge transfer
 - Example: Health research => clinical research => healthcare
 - Or: use of intellectual property instruments
- Where is the political power in the system?

Policy Summary

- Policy can be developed
- Implementing policy is the challenge
- Monitoring and evaluation have to be built in and the results must lead to policy learning
- Now for a real example with parallels with the Sustainable Development Goals (SDGs)

STISA 2024

Science, Technology and Innovation for Africa – 2024 Strategy

- STISA 2024: Accelerate Africa's transition to an innovation-led, knowledge based economy
 - Situational analysis (pp. 16-19) important
 - Sectors – where it is going to happen
 - Agriculture, health, infrastructure, mining, security, water, energy, environment, ...
 - Priority areas – what is going to happen (SDG)
 - Eradication of hunger and achieving food security (2)
 - Prevention and control of diseases (3)
 - Communication
 - Protection of our space
 - Build the society (16)
 - Generate wealth (8)

Science, Technology and Innovation for Africa – 2024 Strategy

- Pillars – how it is going to happen
 - Upgrading/building research infrastructure
 - Enhancing professional and technical competencies
 - Innovation and entrepreneurship
 - Providing an enabling environment for STI development
- Governance?
 - Instruments/ Flagship programmes/ Implementation phases/
 - Funding?
 - Communication – getting the message across

Governance

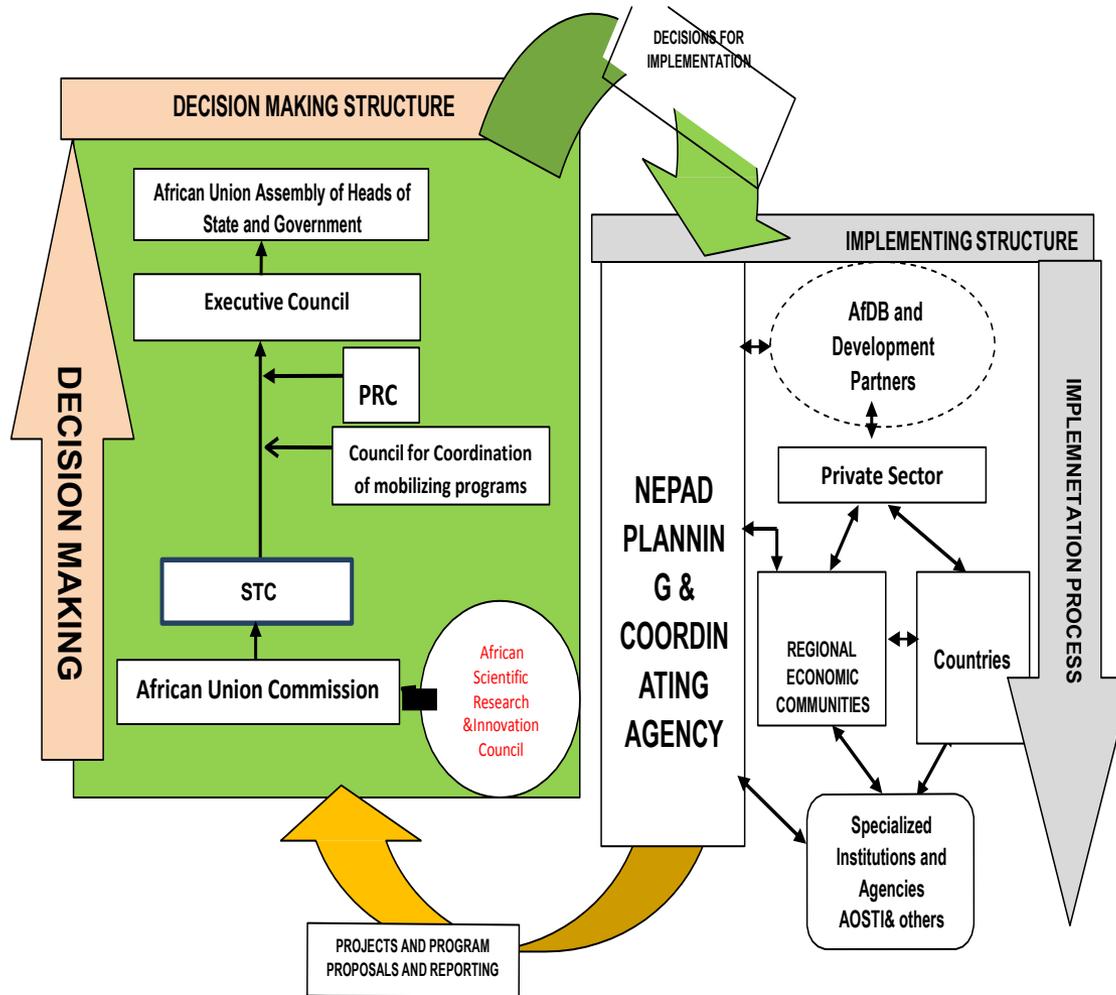


Fig.6 : Overview of Institutional Architecture for implementation of STISA-2024

Monitoring and Evaluation

- Elements of the plan
 - Definition of performance indicators
 - NEPAD Agency, AOSTI, ASRIC
 - Tracking performance
 - NEPAD Agency and AOSTI
 - Integrated Learning
 - Documented by responsible institutions: multi-stakeholder dialogue to ensure feedback into planning at the relevant level of the next implementation phase (2016-2024)
 - Reporting on **targets**

STISA and AU Member States

- Joint AOSTI – UNU-MERIT Course, 6-10 Oct 2014 in Kenya
- Design and Evaluation of Innovation Policy (DEIP)
- Reviewed STISA and the policies of participating countries from Southern and Eastern Africa, including Rwanda (Remy Twiringiyimana 2014)
- Discussed the mapping of country policies onto STISA objectives.
- Work is ongoing (see Iizuka et al.)

New horizons for innovation,
measurement and evaluation

The world changes

- So far:
 - Innovation policy and S&T policy
 - STISA as example (consider also the SDGs)
- Consider
 - SNA Sectors
 - Public sector innovation
 - User innovation (firms and households)
 - (Gault 2015 and the SNA 2008)
 - Restricted innovation
 - Social innovation / grass roots innovation
 - **Sustainable** innovation/ inclusive innovation
 - (Gault, 2014)
 - Sectoral issues
 - Innovation in the informal economy

Sustainable Innovation

- Long-term (measurement implications)
- Multiple issues
 - Economic
 - Environmental
 - Social
- OECD STI Outlook 2014
 - Finland (p.316)
 - Germany (p. 324)
- 6th Annual Sustainable Innovation Forum
 - <http://www.cop21paris.org/>
 - Paris Dec 7-8, 2015

Summary

- This is an evolving subject (Gault 2013, 2014, 2015)
- What matters is what is good for the country **designing** and implementing innovation policy as part of a larger initiative
- Monitoring **and evaluation of** outcomes are essential
- **Innovation policy** matters

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HANDBOOK OF INNOVATION INDICATORS AND MEASUREMENT

Edited by **Fred Gault**, UNU-MERIT, TUT-IERI, the Netherlands and Tshwane University of Technology, South Africa

'This volume is a must read for anyone interested in understanding innovation indicators and their application in policy-making and measuring innovation. Its exhaustive coverage and discussions of many emerging issues makes it an important contribution to the literature on this topic.'

— Krishna Ravi Srinivas, *Science & Public Policy*

'A great book to understand and foster innovation at all levels: a truly innovative piece of work.'

— Enrico Giovannini, *Minister of Labour and Social Policies, Italy*

'This book brings together original contributions from world leading experts on innovation indicators and is unique in several respects. First, the focus is upon innovation in terms of commercialized products and processes and not on secondary indicators of research or patenting. Second, it combines academic perspectives with user perspectives from industry and international organizations. Third, it strikes a good balance between old and new indicators, opening up new dimensions of innovation for measuring. It is a book worth reading for scholars studying innovation, for policy makers and, not least, for innovation managers in the private sector.'

— Bengt-Åke Lundvall, *Aalborg University, Denmark and Sciences-Po, Paris, France*

This *Handbook* comprehensively examines indicators and statistical measurement related to innovation (as defined in the OECD/Eurostat *Oslo Manual*). It deals with the development and the use of innovation indicators to support decision-making and is written by authors who are practitioners, who know what works and what does not, in order to improve the development of indicators to satisfy future policy needs.

This unique volume presents:

- the historical and geographical context for innovation indicators and measurement
- practical examples of how measurement is actually undertaken
- new areas of innovation indicators and measurement, including consumer innovation, public sector innovation and social innovation.

This informative *Handbook* will appeal to policy makers in government departments, statistical offices and research institutes and international organizations such as the EU, OECD and the UN, as well as university departments of economics, sociology, law, science and technology, and public policy.

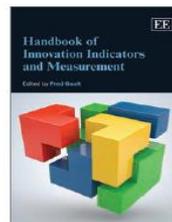
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