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Policy Brief

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Overview

After three decades of trial and error, innovation policy is now taking off in Africa. The African Union recently devised a new strategy called the 'Science, Technology and Innovation (ST&I) Strategy for Africa 2024 (STISA-2024)' in parallel with each member country's efforts to harness ST&I policy. The representatives of 11 Eastern and Southern African countries, two Regional Development communities (SADC & COMESA), NEPAD and the African Union Commission gathered for a workshop on the 'Design and Evaluation of Innovation Policies for Africa' (DEIP-Africa) in Kenya, from 6-10 October 2014. This unique event provided a platform to identify common challenges of implementing ST&I policy in a group of highly heterogeneous countries.

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Innovation for Development in Southern & Eastern Africa: Challenges for Promoting ST&I Policy

INNOVATION POLICY IS NOW TAKING OFF IN MANY African countries. Innovation is seen as a viable solution to economic and social challenges in Africa and effective policy is needed to promote it. To address this need, the African Union has released the Science, Technology and Innovation Strategy for Africa – 2024 (STISA-2024) to provide a framework for innovation strategies in member states and to encourage discussion.

UNU-MERIT, together with two specialised organisations under the African Union Commission (AUC) - the African Observatory for Science, Technology and Innovation (AOSTI) and the Pan African University-Institute for Basic Sciences, Technology and Innovation (PAU-ISTI) - organised a training course in Nairobi, Kenya, 6-10 October 2014.

The course on the 'Design and Evaluation of Innovation Policies for Africa (DEIP-Africa)' was attended by representatives from the AUC, 11 countries from Southern and Eastern Africa, the New Partnership for Africa's Development (NEPAD), as well as two regional institutions: the Southern African Development Community (SADC) and the Common Market for Eastern and Southern Africa (COMESA). Ethiopia, although not part of these two regions, was also represented.

This policy brief reviews the common challenges for participating countries to inform researchers and policymakers of future research areas that would enhance Science, Technology and Innovation (ST&I) policy in Africa. Three points are covered: a brief background of ST&I policy in Africa, diverse and common profiles of ST&I policy in the 11 participating countries, plus challenges and potential research areas.

1. Brief background on ST&I policy in Africa

In the past three decades, there have been many attempts to boost ST&I activities in support of the socio-economic transformation of Africa. The 1980 Lagos Plan of Action for Economic Development could be cited as one of the frameworks

which elaborated the roles that ST&I would play in solving problems including energy deficiency, food insecurity, environmental degradation, disease and water scarcity as well as boosting industrial productivity. The target for African countries to spend at least 1% of their GDP on R&D stems from the same Lagos Plan of Action. Subsequent decisions underscored the importance of investing in S&T; among others, the 1987 Kilimanjaro Declaration, the 1988 Khartoum Declaration, and the 1989 Abuja Statement. The attention paid to S&T put more emphasis on higher education and R&D by increasing research networks, although until recently less emphasis was put on innovation ('I').

The current trajectory of ST&I activities at the continental level was influenced by the Science and Technology Consolidated Plan of Action (CPA), endorsed in 2005 by the African Ministerial Council on Science and Technology (AMCOST) and adopted in 2007 by the Heads of State and Government. The CPA was developed through a series of regional consultations on the needs of the African ST&I community. It had three interrelated pillars: capacity building, knowledge production and technological innovation, which over seven years of implementation underpinned the execution of R&D flagship programmes and those related to improving ST&I policy conditions.

The African Union declaration marking 2007 as the 'Year of Scientific Innovation for Africa' stimulated several developments in the areas of ST&I. This included: re-emphasising the investment of 1% of GDP in R&D by the year 2010; the establishment of centres of excellence in S&T at country and regional levels; the revitalising of African universities; and the 2007 adoption in Maputo, by the first intergovernmental meeting on ST&I indicators, of the Frascati & Oslo manuals. This marked the launch of the African Science, Technology and Innovation Indicators Initiative (ASTII). Two survey waves have been conducted and the outcomes have been published as the African Innovation Outlook in 2010 and 2014 respectively. Also in 2007, the African Union Assembly established the need for an African Observatory for ST&I, which it subsequently created in 2013 as a Specialised Technical Office of the AU for ST&I measurements and as a centre for policy analysis.

Informed by a review of the seven-year implementation of the CPA, the African Union devised a new strategy, the 'Science, Technology and Innovation Strategy for Africa 2024 (STISA-2024)' which it adopted in July 2014. STISA-2024 was designed to provide an enabling environment for ST&I to be an engine for development, by meeting both economic and societal challenges in the broader context of the AU Agenda 2063. A differential in STISA-2024 as compared to the CPA is that it has, at inception, built-in provision for monitoring and evaluation of the implementation of ST&I policy at continental and regional levels.

The DEIP-Africa course, jointly organised by UNU-MERIT and the AUC, is well in line with the aims of STISA-2024. The course will strengthen capacities in the design and evaluation of innovation policy, supporting STISA-2024 and ST&I policies to effectively meet their development goals.

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About the Authors

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2. Diverse and common profiles of the 11 participating countries

The participating countries from Southern and Eastern Africa are diverse in nature. The most recent statistics indicate that their GDP in terms of purchasing power parity (PPP) per capita varies from US$ 16,652 in Mauritius to US$ 746 in Burundi. The median age of the population ranges from 33.3 years in Mauritius to about half that, 15.5 years in Uganda. Population size also differs, from Ethiopia with 94 million to Mauritius with 1.2 million, while the size of economy in terms of GDP PPP varies from Ethiopia (US$ 123,337 million) to Burundi (US$ 7,582).

Table 1: General features of the 11 participating countries

Country	GDP (PPP)		Population	Median Age	% of value added GDP			Employment (% of total employment)			Unemployment	Informal sector (% of)	
	million	per capita	million		Agriculture	Industry	Services	Agriculture	Industry	Services	(%)	Total employment	Total GDP
Botswana	30,673	15,176	2.0	22.0	2.5	36.9	60.6	29.9	15.2	54.9	17.8	3.0	n/a
Burundi	7,582	746	10.2	17.7	40.6	16.9	42.5	92.2	2.2	5.6	7.7	n/a	n/a
Ethiopia	123,337	1,311	94.1	17.5	48.6	10.4	41.0	79.3	6.6	13.0	3.0	50.6	38.6
Kenya	97,249	2,193	44.4	18.5	29.9	17.4	52.7	61.1	6.7	32.2	9.2	77.0	25.0
Malawi	12,353	755	16.4	16.9	30.1	19.3	50.6	n/a	n/a	n/a	7.6	n/a	n/a
Mauritius	21,586	16,652	1.2	33.3	3.3	23.1	73.7	7.8	27.6	64.7	7.9	9.3	n/a
Namibia	21,597	9,377	2.3	20.3	7.1	29.6	63.3	27.4	13.8	58.7	27.4	43.9	n/a
Rwanda	16,552	1,406	11.8	17.8	33.3	14.7	52.0	78.8	3.8	16.6	0.6	n/a	n/a
Tanzania	82,163	1,718	49.3	17.4	27.0	25.2	47.8	76.5	4.3	19.2	12.0	90.0	40.0
Uganda	51,300	1,365	37.6	15.5	25.0	28.7	46.2	65.6	6.0	28.4	4.2	59.8	43.0
Zimbabwe	23,289	1,646	14.1	18.5	12.4	31.3	56.3	66.0	10.0	24.0	10.7	84.0	n/a

For references, please go to: http://www.merit.unu.edu/deipafrica

In terms of economic structure, there is one interesting trend. For all countries except Ethiopia, the service sector contributes the largest proportion of GDP. The picture slightly differs in employment structure, where a majority of countries (seven out of 11) have the highest share of employment in the agricultural sector; the rest have the highest proportion of jobs in the service sector. Unemployment rates also vary greatly across the countries, from 0.6% in Rwanda to 27.4% in Namibia. This is partly due to the differences in defining unemployment in each country.

One striking feature is the large informal sector in these countries. Although it is very difficult to measure accurately and statistically the 'informal sector' its presence is pronounced both in terms of economy (contributing 43% of GDP in Uganda) and employment (contributing 90% of jobs in Tanzania).

Table 2 demonstrates the current status of ST&I policy of participating countries based on the information obtained from each country. Interestingly, all the countries have Developmental Visions (with varying target years). These address overarching issues like poverty reduction, employment generation, food security, social welfare (income equality, public health, education), structural transformation and industrial development, information and communication technology (ICT) and environmental sustainability, with ST&I plans and policies being the integral part. To achieve their vision, different countries emphasise different ST&I policies. For instance, Ethiopia's vision is very much oriented towards export promotion and growth, while Mauritius stresses green growth and Tanzania emphasises enhancing productivity, among others.

Almost half of the countries - namely Botswana, Ethiopia, Kenya, Malawi, Namibia and Tanzania - had S&T policies in the 1990s. In some counties, such as Kenya and Tanzania, S&T poli-

cies date back to the 1970s and 1980s respectively. ST&'I' policy, on the other hand, was newly introduced in the 2000s for all countries bar Malawi, which only revised its S&T policy in 2002.

development, building networks of researchers, ICT and infrastructure development, enhancing institutional capacity, and strengthening linkages with the private sector. If the degree of

Table 2: ST&I policies of the 11 participating countries

Country	Development Vision	S&T Policy	ST&I Policy	STI Policy Objectives & Priorities *						STI Policy Ownership
				Research Capacity	Human Resources	Network of Researchers	ICT	Insitutional Capacity	Linkages with Private Sector	
Botswana	Vision 2016 (drafted in 1997)	Science and Technology Policy (1998)	National Policy on Research, Science, Technology and Innovation (2011)							Ministry of Infrastructure, Science and Technology
Burundi	Vision 2025 (adopted in 2010)	-	National Policy on Scientific Research and Technological Innovation (2011)							Ministry of Higher Education and Scientific Research is currently in the process of putting in place the National Commission for Science, Technology and Innovation
Ethiopia	Vision 2025 (announced in 2011)	National Science and Technology Policy (1993)	National Science, Technology and Innovation Policy (2012)							National Science Technology and Innovation Council and Ministry of Science and Technology
Kenya	Vision 2030 (launched in 2008)	The Science and Technology Act Cap 250 (1977)	Science, Technology and Innovation Act (2013), Draft National Science, Technology and Innovation Policy (2012)							Presidential Advisory; Parliamentary Committee on Education, Research and Technology; National Commission on Science, Technology and Innovation; Ministry of Education, Science and Technology
Malawi	Vision 2020 (launched in 1998)	Science and Technology Act (2003), National Science and Technology Policy (1991 and revised in 2002)	-							National Commission for Science and Technology (under Ministry of Education, Science and Technology)
Mauritius	Vision 2020 (announced in 2008)	-	Draft National Policy and Strategy on Science, Technology and Innovation (2014-2025)	Now collecting baseline data on ST&I indicators						Mauritius Research Council and Ministry of Tertiary Education, Science, Research and Technology
Namibia	Vision 2030 (adopted in 2004)	Science and Technology Policy (1999)	National Programme for Research, Science and Technology and Innovation (NPRSTI - period of three years), Draft Innovation Framework Policy (2011)							National Commission on Research, Science and Technology
Rwanda	Vision 2020 (revised targets adopted in 2012)	-	National Science Technology and Innovation Policy (2006) revised in October 2014 (not yet approved by the Cabinet)							Ministry of Education
Tanzania	Vision 2025 (in place since 2000)	National Science and Technology Policy Framework (1985), National Science and Technology Policy revised (1996)	Tanzania Science, Technology and Innovation Policy reform (2008 - 2013) resulted in a review of National Science and Technology Policy into National Science Technology and Innovation policy; revoked COSTECH Act (2000) into new Act (2013); implementation expected in 2015							Ministry of Communication, Science and Technology
Uganda	Vision 2040 (launched 2013)	-	National Science Technology and Innovation Policy (2009)							Uganda National Council for Science and Technology (operates under Ministry of Finance, Planning and Economic Development)
Zimbabwe	Vision 2020 (late 1980s)	Science and Technology Policy (2002)	Science, Technology and Innovation Policy (2012)							Ministry of Science and Technology Development

Colour Convention - Achievement of Priorities in National STI Policy					
0%	25%	50%	75%	100%	not applicable

For references, please go to: http://www.merit.unu.edu/deipafrica

Based on the information available, it is possible to say that emphasis on 'I', innovation policy, is a recent trend in these countries.

The objectives and priorities of ST&I policy in these countries include common areas such as research and capability development, human resource

achievement in each country in the above priority areas is examined, 'S&T' are more advanced than 'I' concerning strengthening linkages with the private sector and building networks of researchers. This reflects the fact that 'I' components were introduced later and the main actors for implementing ST&I

policy are S&T or higher education ministries (whose usual priorities include strengthening research and higher education over and above ties to the private sector). Note the degree of progress in the chart only refers to the country's plan (*). Hence these evaluations cannot and should not be used comparatively across countries. Nevertheless, certain trends may be observed and, based on the above, the point can be made that more work is needed to strengthen systemic linkage components to improve innovation performance. Apart from these priorities listed in the table, several countries put an emphasis on different priorities, reflecting their visions as well as ST&I policies. For instance, importance in priorities for research infrastructure such as laboratories to support research at university is emphasised in Namibia and Rwanda, while Ethiopia stresses the importance of national quality infrastructure (that is, meeting international standards). Kenya on the other hand, prioritises funding for R&D.

Based on the above observations on the status of ST&I, the next section explores the research areas needed to enhance ST&I effectiveness, with reference to the challenges faced by these countries.

3. Challenges and potential research areas

(1) Systemic challenges

ST&I policy and weak linkages among actors

Overall, the presence of linkages within the innovation system (consisting of organisations, firms, civil society and government, etc.) is weak. This limits the innovation process and may be related to lack of trust or policy coordination among ministries. For many countries, despite having included 'I' for innovation in the ST&I policy, the main focus still lies in formal research at university or public research institutions. For example, few had established linkages with the private sector as the active stakeholder. In most OECD countries, private sectors consist of large but also small and medium scale firms, which invest more in R&D than the public sector. In general, more firms innovate without doing R&D. This suggests that the private sector plays a critical role not only for reaching the target of spending 1% of GDP on R&D, but also for enhancing innovation capacity regardless of R&D expenditure level.

Moreover, the weak linkage is not limited to 'public–private' and 'academia-private (university-industry)' but is also prevalent in 'public-public' (between ministries) and 'academia–public'. This indicates that more research is needed on how to strengthen the linkages between knowledge creation, diffusion and application in the African context.

Governance of policymaking, implementation, monitoring and experimentation

ST&I policy is seen as a major vehicle to achieve the vision. Policy relevance covers public sector fields including education, health, agriculture and transportation, and extends its impact to both economic and social needs. The governance structure of ST&I policy that

"Policy relevance covers public sector fields including education, health, agriculture, transportation, and extends its impact to both economic and social needs."

allows flexible and swift decision-making, followed by effective implementation and monitoring, is critical for enabling developmental goals; yet there are very few functional examples in the region. Furthermore, considering both external risks (such as international trade and exchange regimes) and internal risks (including political instability) faced by institutions, it is important to have a degree of policy autonomy and flexibility for policy experimentation and learning to swiftly adjust to unexpected changes.

Coherence of policy at regional and national levels

A key challenge is to ensure coherence of ST&I policy at country, regional and continental levels. STISA-2024 is the strategy agreed and adopted at continental level; at the same time each Regional Economic Community (REC) and country has its own developmental vision with a distinctive time frame that reflects the realities of each political setting. Maintaining policy coherence and function at the distinctive levels is an important yet challenging task. This requires both bottom-up and top-down approaches of iterative policy learning, where monitoring with sound evidence becomes essential.

Ensuring continuity, accountability and transparency of policy

Political processes often disrupt the policy process. Therefore one challenge is to establish institutions that maintain policy efforts while correcting mistakes through learning by doing, using and interacting. Equally important is to ensure policy legitimacy. Creating mechanisms that allow stakeholder participation in the policy process are time consuming but may enhance impact at the implementation stage. Furthermore, setting reasonable/achievable policy goals requires good evidence combined with reliable system monitoring and evaluation from the outset.

(2) Sectoral challenges

Large informal sector

The informal sector plays a major role in the economy (contributing from 25% to 43% of GDP across the region) and in employment for these countries (contributing from 3% to 90% of jobs) (see Table 1). Given the low presence of the private sector in innovation systems, and prevailing high unemployment rates, this sector has much to offer as a source of innovation, not just for economic growth but also to improve quality of life. Some attempts have been made to 'formalise' the informal sector (in Kenya, for example) while others have taken a more gradual approach to integrating this sector. Considering the potential economic and social impacts, a study of the informal sector (with comparable definitions across Africa) would clarify its role as an integral part of innovation systems.

Large service sector, ICT service sector and structural transformation

Within the formal economy, the service sector is the fastest growing, dominant sector in most of these countries in terms of contribution to GDP (See Table 1). The content of the service sec-

"Too much importance is placed on the academic contribution and too little attention is given to the commercialisation knowledge created or to meeting societal needs."

tor may vary from country to country with commerce, ICT services and the public sector playing lead roles. Among the most critical factors for emerging creative, software, business and financial services is the provision of ICT infrastructure. Its potential for growth is also clear, as seen in the example of M-PESA in Kenya. While this is true, the large proportion of employment in the agriculture sector demonstrates a sharp contrast with the dominance of the service sector in GDP. There is also a pronounced absence of other industrial sectors (excluding mining). This suggests that a structural transformation, led by ICT-related service sectors, is taking place in Africa.

(3) Challenges in Higher Education

Scaling up, improving quality and meeting the needs of the productive sector

Universities play an important role in innovation systems by educating the younger generation and providing much needed human resources. Recently, many efforts have been made to improve access to higher education for the younger generations in Africa. For instance, Kenya increased its number of universities to 67 in 2014; Ethiopia also increased its number of public universities from seven in 2007 to 34 in 2012; Rwanda, on the other hand, merged all public universities to concentrate resources and enhance collaboration among researchers. Despite the fact that scale is expanding, infrastructure, particularly for S&T areas (such as laboratories) is lagging behind. Countries such as Namibia and Rwanda have made this a policy priority.

While valuable, highly educated human resources are generated, many—a percentage as high as 50% in Kenya, for instance—are reported to be unemployed. This indicates a mismatch between higher education programmes and the skills needed in the productive sector.

Putting knowledge into use

Research is another important role for universities; yet too much importance is placed on the academic contribution and too little attention is given to the commercialisation knowledge created or to meeting societal needs (such as those in small-scale agriculture, local communities, use of indigenous knowledge, etc.).

Under the TRIPS agreement, developing countries are obliged to respect intellectual property rights (IPR). The strategic use of IPR may be key to African development because the continent is endowed with a rich biodiversity and indigenous knowledge; yet few studies are available.

4. Next steps

AOSTI plans to work with participating member states to 'map' STISA-2024 with their own policies. UNU-MERIT and AUC, represented by AOSTI, have now signed a memorandum of understanding to join forces for the next five years to enhance capabilities in ST&I indicators and policies in Africa via the DEIP programme. UNU-MERIT, as a UN think tank, will further advance research in the areas noted in this brief.

5. References & useful links

The call for proposals to conduct DEIP-Africa workshops is now open to any government institution in Africa. For more details and references for this paper, please go to: http://www.merit.unu.edu/deipafrica

6. Acknowledgements

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UNU-MERIT is the United Nations University - Maastricht Economic and social Research institute on Innovation and Technology. The institute explores the social, political and economic factors that drive technological innovation, with a particular focus on creation, diffusion and access to knowledge. Following the integration of the Maastricht Graduate School of Governance in December 2010, UNU-MERIT now covers all aspects of governance in domestic and global organisations, from risk assessment to policy analysis, design and evaluation. In its enlarged form UNU-MERIT functions as a unique research and training institute for around 100 PhD fellows, and as a UN think tank addressing a broad range of policy questions on science, innovation and democratic governance. UNU-MERIT is located at, and works in close collaboration with, Maastricht University in the Netherlands.

INSIDE:

Policy Brief

Innovation for Development in Southern & Eastern Africa

An examination of innovation policies as a viable solution to economic and social challenges in Africa, paying particular attention to ST&I policy in Southern and Eastern African countries as well as the African Union's Science, Technology and Innovation Strategy for Africa—2024 (STISA 2024).

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