

Institutional Technology Transfer Policies and Strategies and their Impact on Technology Transfer: The Case of Kenya

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Outline

- Social and Economic Performance
- Status of Science, Technology and Innovation
- Review of the policy, legal and Institutional Framework
- Knowledge generation
 - Priority Areas for Research
 - Size and Type of R&D
- Knowledge use
- Problems associated with technology transfer
- Conclusion

Economic Indicators

	2007	2008	2009	2010	2011
Real GDP Growth (%)	7	1.5	2.7	5.8	4.4
GDP Per Capita (Constant)(Ksh)	36,000	36,983	36,986	38,306	38,970
Trade balance (% of GDP)	-0.18	-0.2	-0.19	-0.21	-0.27
Current account balance (% of GDP)	-3.8	-6.3	-5.2	-7.4	-9.7
Gross fixed capital formation (as % of GDP)	19.4	19.4	19.6	20.3	20.1
Gross savings (as % of GDP)	13.9	15.9	12.9	11.3	13.2
Incremental Capital Output Ratio	2.7	12.8	7.4	3.4	4.8
Inflation rate (%)	4.3	16.2	10.5	4.1	14
Cover ratio (%)	45.4	44.8	43.8	43.3	38.8

Social Indicators

	2011	2010	2009	2008	2007	2006
Health expenditure, total (% of GDP)		4.8	4.8	4.2	4.4	4.5
Literacy rate, youth total (% of people ages 15-24)		92.8			83.9	
Mortality rate, infant (per 1,000 live births)	48.3	50.1	51.9	53.3	55.5	57.3
Prevalence of HIV, total (% of population ages 15-49)	6.2	6.2	6.2	6.3	6.4	6.6
Prevalence of undernourishment (% of population)	30.4			32.4		
Public spending on education, (% of GDP)		6.7				7.04
Life expectancy at birth, total (years)	57.1	56.5	55.8	55.1	54.4	53.7
Population growth (annual %)	2.7	2.6	2.6	2.6	2.6	2.6
Population (Million)	41.6	40.5	39.5	38.5	37.5	36.5
Labor force (Million)		15.5	14.9	14.5	14.1	13.7
Labor participation rate, total (% of total population ages 15+)		66.3	66	65.7	65.4	65.1

STI Indicators

	2005	2007	2010	2011
Research and development expenditure (% of GDP)		0.42		
Researchers in R&D (per million people)		56.2		
Patent applications, nonresidents	59	91	120	
Patent applications, residents	34	41	77	
Trademark applications, direct nonresident	696	752	895	
Trademark applications, direct resident	1017	1428	2031	
Scientific and technical journal articles	225.8	262.2		
Royalty & license fees, payments (BoP, current US\$Million)	36.9	23.6	17.8	15.1
Royalty and license fees, receipts (BoP, current US\$ Million)	17.5	23	53.8	55
Foreign direct investment, net (BoP, current US\$)	11.5	693	176.5	326
Foreign direct investment, net inflows (% of GDP)	0.1	2.7	0.6	1
High-technology exports (% of manufactured exports)	2.9	5.5	5.7	
High-technology exports (current US\$ Million)	31.6	82.7	99.9	

Technology Readiness

	Kenya		Uganda		Tanzania		S. Africa	
	S	R	S	R	S	R	S	R
Availability of latest technologies	4.9	74	4.5	104	4.1	122	5.7	39
Firm-level technology absorption	4.9	58	4.3	103	3.9	129	5.4	38
FDI and Technology Transfer	4.8	63	4.8	60	4.7	66	5	38
Individuals Using Internet (%)	28	92	13	112	12	113	21	95
Broadband Internet subscriptions/100 population	0.1	120	0.3	114	0	137	1.8	95
International Internet bandwidth kb/s per use	4.5	110	1.8	125	0.9	133	18.9	63
Mobile and broadband subscriptions/100 population	0.3	119	2.8	96	1.2	109	19.8	49

Innovation

	Kenya		Uganda		Tanzania		S. Africa	
	S	R	S	R	S	R	S	R
Capacity for Innovation	3.5	46	2.8	102	3.1	71	3.5	41
Quality of Scientific research Institutions	4	50	3.4	86	3.6	71	4.6	34
Company spending on R&D	3.7	31	2.9	89	3.3	55	3.5	39
University-Industry collaboration in R&D	4.2	41	3.6	68	3.6	56	4.5	30
Government procurement of advanced technology products	3.5	76	3.6	68	3.5	73	3.1	105
Availability of scientists and engineers	4.1	66	3.8	89	3.6	105	3.4	122
PCT Patent Applications/millions population	0.1	95	0	118	0	117	6.8	37

Review of Relevant Policy

- Vision 2030 provides the country's development goal
 - It amongst many things priorities the promotion of STI
- *Sessional Paper No. 5 of 1982 on Science and Technology for Development*
 - Identifies research, experimental development technology acquisition, technology transfer, human resource development as critical for promotion of STI
 - Identified priority areas for research and development
 - Aims to allocate 1% of GDP on research and experimental development
- *Sessional Paper No. 1 of 2005 on Policy Framework for Education Training and Research*
 - Recognizes the role of R&D in human & national development
 - R&D to be prioritized as a national priority
 - Advocates for the establishment of R&D Fund
 - Promotes collaborative demand driven research

Review of Relevant Policy ...continued

- *Policy Framework for Science, Technology and Innovation (2012)*
 - Policy to facilitate the achievement of Kenya Vision 2030
 - Review of institutional framework which proposes the establishment of NCSTI, Kenya Innovation Agency & National Research Fund
 - 1% of GDP for R&D
 - Promote R&D in private enterprises through incentive schemes and PPP

Review of Relevant Policy ...continued

- The policy documents identified some common challenges;
 - Limited research;
 - Inadequate funding
 - Weak linkages
 - Low rates of commercialization
 - Weak institutional framework

Sectoral Policies on R&D

- Sessional Paper no. 4 of 2004 on Energy
 - Recommends for research in different energy sources and for the development of relevant technology
- Kenya Health Policy (2012-2030)
 - Recommended for the increase of collaboration
- National Seed Policy (2011)
 - Provides policy on regulation of seed research
- Draft National Policy for Protection of Traditional Knowledge, Genetic Resources and Expression of Culture
 - Provides policy for benefit sharing, transfer procedure & protection of traditional knowledge & genetic resources

Sectoral Policies on R&D...continued

- Draft National Intellectual Property Policy
 - Provides guideline & implementation strategies IPR
- Draft Traditional Medicine and Medical Plants Policy
 - Provides for the commercialization of traditional medicine including benefit sharing of herbal resources
- Draft National Bioscience Policy
 - Provides for the safe exploitation & application of biological resources, biotechnology including research and development
- Draft Energy Policy
 - Provides for the promotion of research, dissemination and coloration in the energy sector

Review of Relevant Statutes

- Science, Technology and Innovation Act (No. 28 of 2013)
 - Establishes the institutions identified in the policy including; Kenya National Innovation Agency; the National Commission for Science, Technology (*to replace NCST*) and Innovation & National Research Fund.
 - Also establishes Technology Acquisition Offices to support institutionalization of TTOs in R&D institutions
 - Re-establishes the 6 R&D Institutions provided by the 1977 Science and Technology Act

Review of Relevant Statutes...continued

- The Kenya Agricultural and Livestock Research Act (No. 17 of 2013)
 - Establishes the Kenyan Agricultural and Livestock Research Organization to regulate, promote and coordinate R&D in the sector throughout the country
 - reconstitutes the research institutions listed in the Science, Technology and Innovation Act, (No. 28 of 2013) with the introduction of 18 field specific institutes

Review of Relevant Statutes...continued

- Universities Act (No. 42 of 2012)
 - Establishes the Commission of University Education (*successor to the Commission of Higher Education*); University Funding Board and Kenya University and Colleges Central Placement Service Board
 - Universities established under the earlier Act are to be established under this Act and chartered within an year of its commencement
- Technical and Vocational Education and Training Act (No. 29 of 2013)
 - Providing to TVET system of education and to govern TVET institutions

Review of Relevant Statutes...continued

- Biosafety Act (2009)
 - Establishes the Biosafety Authority and regulates GMOS
- Environmental Management and Co-ordination Act (Act no. 8 of 1999)
 - Establishes NEMA
 - Provides regulation governing conservation of biological diversity
- KIPPRA Act (Cap 15 of 2006)
 - established the Kenya Institute for Public Policy Research and Analysis (KIPPRA) to undertake policy analysis & research, economic forecasting for economic & social development

Review of Relevant Bills

- Traditional Medicines Bill
 - Regulates activities by traditional medical practitioners
- Atomic Energy and Policy Bill
 - Promote & support the exploitation of nuclear energy
- National Bioscience Bill
 - Promotes the development, research and regulation of biosciences
- National Drug Control Authority Bill
 - Establishes National Drug Control Authority to undertake various functions including research

Priority Areas for Research

- Sessional Paper No. 5 of 1982 prioritizes research in agriculture; forests; fisheries; wildlife; industry; bio-medical; minerals; construction & energy.
- The 2012 STI policy priorities include;
 - Agriculture & Rural development;
 - Health & Life Sciences;
 - Trade & Industry;
 - Human Resource Development;
 - Physical Infrastructure;
 - Energy; Environment & Natural Resource Management;
 - ICT; & Space Science Technology.
 - The policy further priorities biotechnology; space science; telecommunications, electronics & computers; automobile & nuclear electricity.

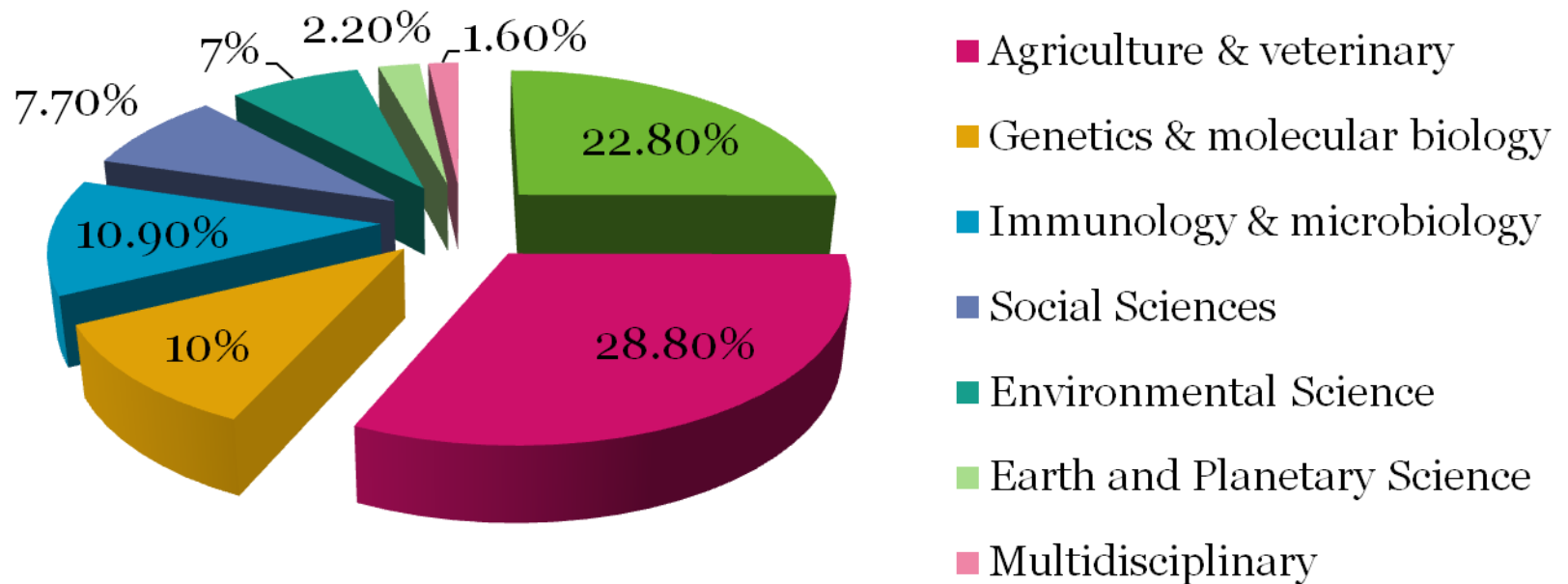
Size and Type of R&D

- Kenya spends 0.48% of GDP in R&D compared to the UNESCO & NEPAD recommended 1%
- Majority of R&D is conducted by the government;

Type of Expenditure	Million PPPs (\$)	Percentage (%)
GERD	277.8	100%
BERD	5.9	2.4%
GOVERD	193.3	69.6%
HERD	14.9	15.1%
Private non-profit organizations	35.8	12.9%

Size & Type of R&D

top 9 fields account for 91% of total output



- Most of the research undertaken in Kenya is agricultural & medical research which accounts for half (51.6%) of research output in 2005-2009

Knowledge Creation

- Agricultural Research
 - Funding sources include government, donors, development bank loans, etc
 - Said to be well funded compared to other African countries
- Medical Research
 - Priority areas for drug R&D to be developed jointly with relevant institutions
 - Majority of funding for medical research is from donors (77.9% in 2010/11)

Knowledge use

- Agricultural Research
 - There is evidence in literature of the dissemination and use of agricultural research
 - E.g Research on Maize; Cassava; Coffee, Sugarcane, Tea Indigenous Chicken;
 - Dissemination; field days, workshops, journals etc
 - Studies reveal that low utilization; low adoption of technology largely due to inadequate information/knowledge, financial constraints, market challenges & drought
 - Evidence of commercialization of findings
 - UoN/MEA fertilizer case
 - Evidence of partnerships & collaborations
 - Reported private sector research is in horticulture

Knowledge use

...continued

- Medical Research
 - Evidence of dissemination through workshops & publications
 - KEMRI undertakes research on traditional medicine to establish the efficacious properties and therefore assist in standardization of preparation
 - Developed medical products such as treatment of herpes infection & management of hypertension
 - KEMRI developed rapid pregnancy kit, hand sanitizer etc
 - Both KEMRI & UoN-School of Pharmacy conduct clinical trials
 - There are 45 licensed pharmaceutical companies that have capacity to carry out research

Knowledge use

...continued

- Industrial Research
 - Success stories from KIRDI include entrepreneurs that produce leather gloves for flower farmers, fish leather products, bar and detergents, skin care products, honey products, ceramics, bricks & arc welding machines.
- Private sector
 - Only 5.7% of companies surveyed in a 2004 IP audit commercialized their products
 - There are a number of TNCs in Kenya providing R&D & facilitating technology transfer especially in agricultural; horticultural sector

Problems associated with Technology Transfer

- Limited R&D activity
- Limited linkages & Weak collaborations
- Limited financial constraints
- Limited technological capability
- Infrastructural challenges
- Inadequate human resource capacity
- Policy gaps

Conclusion

- Investments in STI can assist Kenya in achieving its goals and promoting industrial and economic growth which has fallen since 2008
- Knowledge creation activities are on-going
- Literature on adaptation, use and commercialization of research is however limited
- What is however available reveals that adoption & commercialization is low
- There are benefits to be had with the use of local knowledge to address local challenges
- Need for comprehensive research

Thank-you