Ee-JRIF
Ethiopian e-journal
For Research and Innovation Foresight

Vol 7, no 1, (2015): May 2015

Notes from Editors:

Mammo Muchie and Seble Worku

Investing in Future Research and R&D Capacity

The overall objective of scientific research is to generate new knowledge, new technology and enable innovative thinking. These in turn create future economic growth and wealth through entrepreneurship and availability of new technologies and new outputs. For the individual researcher, the purpose of research would be immediate satisfaction of intellectual curiosity, be at the forefront of potentially new technical field, to belong to a particular research group, or to be able to participate in conferences and be able to network with individuals with similar interests. The available research publications in Ethiopia including the stock of publications contained in the Ethiopian e-journal for Research and Innovation Foresight (Ee-JIRF) show that the research emphasis for Ethiopian researchers revolves around food security, climate change, infectious diseases and other health related issues. This is of course in line with the country's development policy which is geared towards agriculture led industry given its large land and water resources. Furthermore, Ethiopia has planned to achieve middle income country level by 2025. This would need a successful system of innovation and the manufacturing sector would have to play a crucial role as a driver of innovation and productivity of growth.

The biggest asset of an economy is its human resources. The emergence of skilled biased technology has hampered the growth of those countries that did not develop them or has reduced them to rely on remote coaching. In a report published in 2012 and tilted 'Education & Skills Mismatch', the African Economic Outlook published that " In Egypt,…, about 1.5 million young people are unemployed, while at the same time private sector firms cannot fill 600 000 vacancies. In South Africa, the situation is even more extreme, with 3 million young people not in Education, Employment, or Training (NEET) and 600 000 unemployed university graduates versus 800 000 vacancies" (African Economic Outlook, 2012). High skill labour demand requires intense innovation. Hence this calls for a shift in skills development as well as innovative thinking. This in turn requires skills planning which involves interaction between learning institutions. Furthermore, decision makers in government must take

cognisance of the strategic importance of expanding on research and development to support the government's social and economic agenda.

How does a country prioritize its research needs? Traditionally the role of the government in the research agenda setting value chain is setting public policies that would respond to the needs of the particular country. In the case of Ethiopia, this would probably imply searching for new sources of economic growth and poverty alleviation. Researchers are then expected to align their research topics with national priorities; donors or investors which can include businesses to align their research funding schemes to the national agenda; policy makers have to measure the impact of their policies. Citizens, community members and civil society organisations are expected to hold into account everyone that is involved in this process. In the end, the country has to prioritize its research needs by balancing the needs of the various stakeholders.

In recent years, Science and Technology (S&T) indicators have been suggested to be good pointers in understanding the country's international competitiveness as well as evaluating the contributors to its economic growth. Although the Ethiopian Science and Technology Commission was established in 1977 with the aim of collecting and disseminating scientific and technological information, it did not accomplish much. A Science and Technology Information Center (STIC) was then established in 2011. Ethiopia ratified a Science, Technology Information and Innovation policy in 2012 for the purpose of creating a technology transfer framework for developing national capacity in learning new technology, adaptation of new technology, selecting and importing current technologies, providing service to enterprises. Ethiopia began tracking science and technology indicators since 2010. It conducted 3 research and development (R&D) surveys in 2010, 2013 and 2014. The latest survey was conducted by the STIC.

Table 1 sets out the latest R&D figures and indicators for Ethiopia. The Gross Expenditure on R&D (GERD) amounted to 5, 2 billion Birr; GERD as a percentage of GDP was 0.61%. The target for the continent is set to 1%. With a ratio of employed to the total population of 53%, unemployment is not yet a big problem in Ethiopia, especially in the rural areas given the rural population still predominantly involved in subsistence agriculture. The labour force is largely confined within the skilled agricultural, forestry and fishery workers or elementary employment[1]. According to the latest labour force survey, 1,6 million of the population reported having completed a higher diploma or a degree. This translates to only 38 individuals per 1000 employed individuals to have a post school qualification. Ethiopia reported a total of 18,435 R&D personnel in 2014 out of which 8,218 were classified as researchers; only 1,093 of these researchers were women. Hence the total number of R&D personnel and researchers are a minority. Women researchers as a percentage of total researchers (FTE) amounted to 13 and women researchers as a percentage of total R&D personnel (FTE) amounted to 5. Hence there is a vast disparity between the genders with men prominently occupying these positions.

[1] Refer to Table in annexure

Table 1: Key economic indicators for 2013

Indicator	Value 2013
GDP current prices (Birr)	852,740,000,000
National Population	80,444,148
GDP per capita in Birr (crude)	10,600
Total employed	42,403,879
Employed as a percentage of the total population	53
Total unemployed	1,981,165
Total population with diploma completed	1,051,743
Total population with degree completed	578,267
Gross domestic Expenditure on R&D (GERD) (Birr)	5, 242,607,978
GERD as a percentage of GDP	0.61
Total R&D personnel (FTE)	11,571
Total researchers (FTE)	4,332
Women researchers (FTE)	558
Women R&D personnel (FTE)	2,635
Total R&D personnel (headcount)	18,435
Total researchers (headcount)	8,218
Women researchers (headcount)	1,093
Women researchers as a percentage of total researchers (FTE)	13
Women researchers as a percentage of total R&D personnel (FTE)	5
Women R&D personnel as a percentage of total R&D personnel (FTE)	61
Total R&D personnel per 1000 employed (FET)	0.3
Total researchers per 1000 employed (FET)	0.1
Total individuals with post school qualifications[2] per 1000 employed	38

Source: Ethiopian Science and Technology Indicator Report 2014; statistical report on the 2013 National Labour Force Survey, Central Statistical Agency

Table 2 presents the GERD distribution by type of research. Most of the R&D activity that is conducted in the country takes place within the higher education sector with an expenditure of 3,9 billion Birr (74.1%) followed by the government sector 1,3 billion Birr (24.5%). The HERD as a percentage of the GDP was estimated to 0.46% whereas the GOVERD as a percentage of the GDP was estimated to 24.5%. Although in other countries the business sector is the largest contributor to the GERD, this is not the case in Ethiopia. The BERD comprised of only 1.2% of the GERD in 2013 showing that the conditions for R&D activities are non-conducive.

[2] Total population with degree or diploma completed

Table 2: GERD by type of research 2013

Expenditure	Business (BERD)	Government (GOVERD)	Higher Education (HERD)	Private not for profit organisation	GERD
Total (in Birr)	61,581,049	1,283,897,402	3,884,890,110	12,239,417	5,242,607,978
Percentage	1.2	24.5	74.1	0.2	100.0
As a % of GDP	0.01	0.15	0.46	0.00	0.61

Source: Ethiopian Science and Technology Indicator Report 2014

The business sector is usually the largest source of R&D funding. However in Ethiopia, R&D is largely funded by the government. Close to 79% of R&D funding originates from government and 19% from within the entity itself; foreign funding accounts for 2% of the total R&D funding. It is not possible to determine the actual amount spent by research type: basic research, applied research and experimental development. Actual expenditure by research field or socio-economic objective is also not available in order to evaluate the impact of existing R&D activities on the socio-economic conditions of individuals.

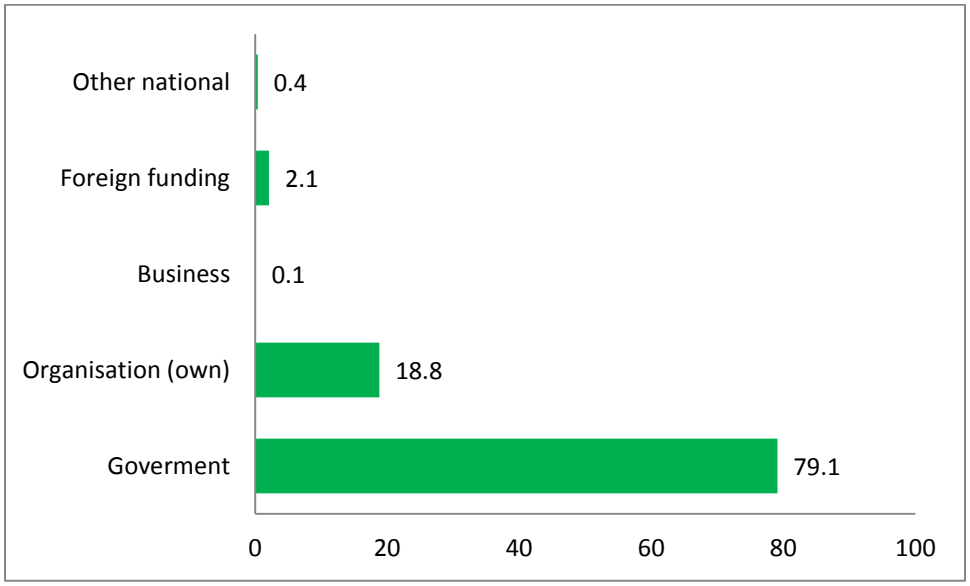

Figure 1: Source of funding for national R&D activities

Source: Ethiopian Science and Technology Indicator Report 2014

Economic theory assumes that innovative businesses would perform better than others in terms of processes efficiency and hence improve on the share of profit. Since innovation goes hand to hand with research and development, then one would expect the lower the research output the less the level of innovation. Hence having the public sector as the largest funder of national R&D activities, does not benefit businesses unless mechanisms are put in place for the latter to benefit from these initiatives. The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a

decent standard of living (United Nations, 2015). The HDI indicates the capability of the people within the country in fulfilling its future achievements. Ethiopia was ranked 173 in 2013, given its low HDI level which grew at a very slow pace since 2000.

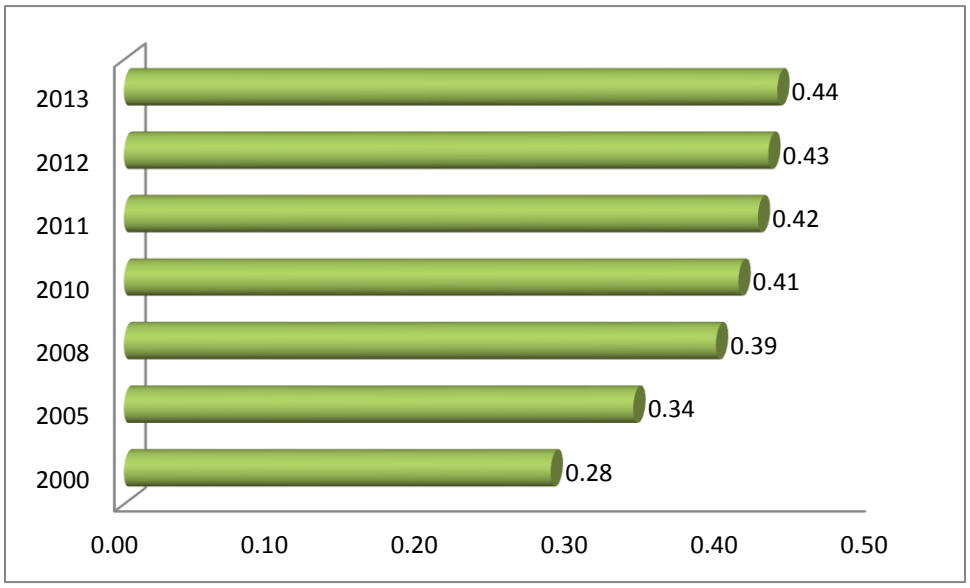

Figure 2: Ethiopian Human Development Index, UNDP

Investment in future research and R&D capacity is necessary in order to stimulate Ethiopia's innovation capacity and hence participation in its funding should not only be left to the public sector. Ee-JIRF will continue to play a significant role in promoting national research in all fields and across a wide range of subject.

In this issue, we present 5 articles with diverse content. The first article deals with the determinants of utilization of maternal health care services in Ethiopia. The motive behind this research is attributed to the low utilization of health care services by pregnant women possibly due to lack of access to these facilities. This is currently a critical issue in Ethiopia since maternal and child mortality rates are among one of the highest in the world. According to the World Bank, in 2013, the maternal mortality ratio amounted to 420 per 100 000 live births; the infant mortality rate was 44 per 1000 live births and births attended by skilled health staff was 23% (World Bank database, 2015). The author uses the Ethiopian Demographic and Health Survey data collected in 2011 to analyse factors that contribute to variations in the use of antenatal care and delivery care services in the country. The results show that among others, mothers' educational status, the role of health care workers and mothers' exposure to media to be the main factors of ANC usage.

The second article presents research done on 462 diabetes mellitus patients that were followed up for 8 years at the Yekatit II Hospital in Addis Abeba, Ethiopia. The motivation for this study stems from the increasing number of diabetic cases in Ethiopia in recent times and the burden associated to this disease. In this study, the author provides survival probability estimates of patients diagnosed with diabetes and identifies significant risk factors for mortality and morbidity.

The third article presents research conducted on demographic and socioeconomic determinants of time use for household activities in Kolfe Keranyo Sub city (Addis Ababa, Ethiopia). This study is the first

of its kind conducted in Ethiopia in 2013 and serves as a baseline in quantifying women length of time spent for household activities. Ethiopia is a patriarchal society and much of household work allocation is based on traditional gender roles. Hence most of the domestic work would fall squarely on women and girls' shoulders. Men do not participate in child rearing, cleaning and cooking whereas in the rural areas women are expected to help in planting and harvesting the land. It is not thus surprising to see that the average minutes of domestic work participation by women which amounts to 476.6 minutes per reference day is 7 times higher than of men. In addition, educational level had considerable effect on time use for household activities but the association was not statistically significant in this study.

The fourth paper discusses the assessment of extreme rainfall over the horn of Africa using global climate models. The study analyses the rainfall season during October-December which is characterized with strong El Niño Southern Oscillations signals and high rainfall variability leading to drought and floods. The paper evaluates eight individual models for seasonal rainfall forecasting over the region. This sort of analysis is important for socio-economic planning and risk reduction associated with climate extremes.

The last article titled "Manufacturing Emperor Tewodros's cannon at Gafat". The paper identifies significant sites that have basic acquaintances with Emperor Tewodros II (1855 – 1868) in Dabra Tabor and its surroundings. It is an account of the field trip conducted 11- 16 April, 2009 from Gafat to Maqdala along the route which Emperor Tewodros dragged the cannon. In the first part of the paper the author describes the geographical location of Gafat and the reason behind its choice to manufacture the cannon. The paper also describes the sites where the raw materials used to construct the cannon were sourced and where the actual building of the cannon took place. It also indicates the kind of technology used for building the cannon and the human resources used.

Together, the research papers contribute to the creation of relevant knowledge that will continue to influence learning to make a difference to an ancient country Ethiopia with strong ambitions to reach the highest stage of modernity.

REFERENCES

African Economic Outlook:
http://www.africaneconomicoutlook.org/theme/youth_employment/education-skills-mismatch/

Central Statistical Agency, Statistical Bulletin, 2014. Statistical Report on the 2013 National Labour Force Survey, Addis Abeba, Ethiopia.

The Federal Democratic Republic of Ethiopian Science and Technology Information Center, 2014. Science and Technology Indicators Report 2014, Addis Ababa, Ethiopia.

United Nations Development Program, 2015. Human Development Reports, http://hdr.undp.org/en/countries/profiles/ETH

World Bank, 2015. World Bank data: http://data.worldbank.org/indicator/SH.STA.MMRT/countries

Annexure

Employed by Major Occupational Groups

	Total employed	Managers	Professionals	Technicians and associate professionals	Clerical and support workers	Service and sales workers	Skilled agricultural, forestry and fishery workers	Craft and related trades workers	Plant and machine operators and assemblers	Elementary occupations	Others
Total	42,403,879	231,211	563,231	804,750	221,028	3,670,391	20,321,430	1,849,506	424,314	14,302,768	15,249
Males	22,886,647	169,903	381,562	540,334	77,697	1,275,777	13,663,029	892,789	362,144	5,512,000	11,411
Females	19,517,232	61,308	181,668	264,416	143,331	2,394,614	6,658,401	956,717	62,170	8,790,768	3,838
Males	54.0	0.7	1.7	2.4	0.3	5.6	59.7	3.9	1.6	24.1	0.0
Females	46.0	0.3	0.9	1.4	0.7	12.3	34.1	4.9	0.3	45.0	0.0

Statistical report on the 2013 National Labour Force Survey, Central Statistical Agency