

Assessing the needs of the research system in Ethiopia



Report for the SRIA programme

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**“Assessing the needs of the research system in
Ethiopia. Report for the SRIA programme”**

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Executive Summary

This report provides a high-level assessment of Ethiopia's research and innovation system and key research organisations. It seeks to identify the main challenges to research capacity strengthening and some priority areas for intervention in order to support decision-making at DFID and among Ethiopian partners. The study does not seek to explore issues such as the historical causes of the current situation or the role of the media and other political actors which, albeit important, fall outside the scope of this investigation. Findings in this report are based on quantitative and qualitative data collected through desk-based research and informant interviews. Over 100 indicators are used to assess the country's research environment and political economy context, research production and research diffusion performance. Some of the qualitative findings are based on the views of a small but balanced number of stakeholders and should be verified through further research.

A. Needs Assessment for Ethiopia

Political economy context. Ethiopia is an authoritarian regime whose political instability and limits to academic freedom create a systemic barrier to research production (**Freedom House**). The **World Bank** places Ethiopia towards the very bottom of a global ranking of government stability and voice and accountability, while **Freedom House** finds that Ethiopia is 'not free' and finds that academic freedom has been seriously compromised. However, the democratic transition initiated in 2018 provides a reason for optimism. With a GDP of USD772, Ethiopia is one of the poorest countries in the world – yet a lower proportion of the population (27%) lives in poverty compared to more affluent countries considered in this study. Literacy rates of 39% are well below the average for Sub-Saharan Africa (64%) according to the **World Bank**. Ethiopia published a National Science, Technology and Innovation Policy (**STI Policy**) in 2012, but to date has no dedicated research policy. Policy is driven by the National Science, Technology and Innovation Council (NSTIC), chaired by Ethiopia's Prime Minister. The consultation highlighted that policy aspirations are not yet translating into effective interventions and there is very little activity in terms of policy monitoring and enforcement at the organisation level. It was also found that government ambition to use research as an engine of development is undermined by lack of funding and skills among research organisations, policymakers and economic actors.

Research production. While Ethiopia's research production is severely deficient (**Scimago**), the sector is showing improvements. Ethiopia has a low number of researchers (45 per million inhabitants), less than half than the African average. Over half of them are employed by the government (56%) while the remainder are employed in higher education institutions. Gross expenditure on research and development (GERD) was 0.6% of GDP in 2013, lower than the government objective of 1% but up from just 0.17% in 2007 (**UNESCO**). The number of universities has grown significantly, from just two universities until 1991 to over 30 universities today, although reporting on this figure differs (see Section 4). The growth was spurred by demand for education, but it remains insufficient to service a country with over 110 million inhabitants. Moreover, universities contribute little to research production (**UNESCO**). Most research is undertaken by government-sponsored non-academic organisations, but research capacity strengthening is minimal and donor engagement in this area is limited compared to other Sub-Saharan African countries. Research infrastructure, both physical and digital, remains underdeveloped (**World Economic Forum**).

Research diffusion. Ethiopian research produces 33 papers per million people, less than most other countries considered in this study, and the number of citations per published paper is low ([Scimago](#)). While a low share of research expenditure comes from abroad, the country has recently sought to incentivise international research partnerships. According to Scimago, the proportion of papers written with international partners is significant (58% in 2018), yet lower than other Sub-Saharan African countries. Innovation is also lagging. Despite being a national priority, interviews suggest that knowledge exchange activities are limited and government, business and other non-academic stakeholders are underutilising research. According to [WIPO data](#), no patent application has been filed in Ethiopia by residents or non-residents over the past 10 years.

B. Options for research capacity strengthening

Overall, Ethiopia's research system appears underdeveloped and would benefit from initiatives that support research production and diffusion. Three areas appear important:

- **Establish thematic centres of excellence in priority areas.** Ethiopia has clear needs across all the inputs needed for research production – human capital, funding and infrastructure. The underdeveloped status of the research system, political instability and ongoing tensions between government and universities make it difficult for donors to embark on system-level interventions. Instead, it may be beneficial to work with more research-oriented universities to establish thematic centres of excellence that operate in one or more of the priority areas identified in the National Development Plan. Activities could focus on building research culture, capacity, infrastructure and good management practices at school/faculty level. This type of intervention is working elsewhere in Africa (see the World Bank-funded [ACE programme](#)) but there is nothing like this in Ethiopia.
- **Strengthen policy implementation capacity.** While the Ethiopian government is committed to research, the consultations shows that policy implementation remains lacking. Donors could build government capacity to translate policy aspirations into clear key performance indicators (KPIs), and to set up monitoring and evaluation (M&E) systems. A focus on policy implementation capacity might create opportunities to increase stakeholder involvement as a way of lowering implementation and monitoring costs, and space to discuss the coordination problems affecting ministries. Once M&E is established, this would also create an opportunity to introduce research quality standards and incentives for research production.
- **Invest in knowledge exchange.** The Ethiopian government has indicated a willingness to invest in knowledge exchange activities. However, the consultation process found that the country does not have the knowledge and skills to commercialise research. If there is an investment in thematic research centres, then a natural extension of that intervention could be to also invest in supporting the use of research products (including through commercial means). External donors could work to build technology transfer capacity and establish good practice in the dissemination of research to social and economic actors. Partnerships between Ethiopian and UK universities could be a promising way forward. Establishing a connection between users and producers of the research is also likely to support internal demand for research, potentially creating positive reinforcement for national investments in research.

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Glossary

Organisations

AAU	Addis Ababa University
ARIPO	African Regional Intellectual Property Organisation
AU	African Union
ECNRCMS	Ethiopian Copyright and Neighbouring Rights Collective Management Society
EPRRI	Ethiopian Economic Policy Research Institute
EIPO	Ethiopian Intellectual Property Office
EPHI	Ethiopian Public Health Institute
EPRDF	Ethiopian People's Revolutionary Democratic Front
MoIT	Ministry of Innovation and Technology
MoSHE	Ministry of Science and Higher Education
MoST	Ministry of Science and Technology
NSTIC	National Science, Technology and Innovation Council
OECD	Organisation for Economic Co-operation and Development
SIDA	Swedish International Development Cooperation Agency
WIPO	World International Property Organisation

Other acronyms

CRIS	Current Research Information System
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GERD	Gross domestic Expenditure in Research and Development
KE	Knowledge exchange
KPI	Key Performance Indicator
LMIC	Low- medium-income country
M&E	Monitoring and evaluation
NGOs	Non-Governmental Organisations
NGTP	National Growth and Transformation Plan
PPP	Purchasing power parity
R&D	Research and development
RCS	Research capacity strengthening
RO	Research office
STI	Science, technology and innovation
TTO	Technology transfer office
TVET	Technical and vocational education and training

1. Introduction

This report presents the results of an assessment of Ethiopia's research needs and it is part of a broader needs assessment of the seven countries in the 'Strengthening Research Institutions in Africa' (SRIA) programme: Ethiopia, Ghana, Kenya, Nigeria, Rwanda, Tanzania and Uganda.

1.1. Structure of the report

The document is divided into two parts. The first part presents a political economy analysis of the country, building on **DFID's guidance**. Section 2 discusses the country's 'structures', or long-term contextual factors that have a direct or indirect effect on the research system. Section 3 looks at the legal and policy framework for research, while section 4 analyses relevant political economy dynamics within the country, specifically looking at relations between public sector bodies, research organisations and individual researchers. The second part of the document assesses research performance in the country. Section 5 explores research production by assessing research inputs, research culture and support, and research outputs. Section 6 assesses research diffusion by looking at actors and networks working on knowledge exchange (KE), and existing KE practices. The last part of the document focuses on the main bottlenecks or constraints affecting the research system and discusses opportunities to strengthen research capacity. It builds on the performance indicators explored in the previous section and considers the overall impact of each indicator on the research system. A full list of indicators and their relative score is contained in Appendix A.

1.2. Methodology

The evidence presented here has been obtained through desk research and informant interviews. Desk research gathered quantitative data from 16 sources (see Appendix E), while qualitative data was obtained from interviews with 4 informants, working for the government and research organisations based in Ethiopia (see Appendix C). Interviews were conducted, recorded, transcribed and analysed using a consistent methodology. Qualitative findings reflect the perceptions of more than one stakeholder, and they have been compared, wherever possible, with available data from published sources. They informed the authors' views on the country performance on each of the indicators listed in Appendix A.

This report has been peer reviewed by the individuals listed in Appendix D and circulated with interviewees for comments and clarifications. Previous versions have been significantly improved in response to the constructive feedback provided by Dr Tom Drake and Dr Alba Smeriglio (DFID), as well as input from DFID staff located in relevant country offices.

1.3. Limitations

The study provides a high-level assessment of the strengths and weaknesses of the Ethiopian research system and research organisations. It paints a broad picture of the current situation to inform understanding and action by DFID and others; it does not seek to explore issues such as the historical

causes of the current situation or the role of the media and other political actors which, albeit important, fall outside the scope of this investigation. The qualitative findings are based on the views of a small number of stakeholders and should be verified through further research.

2. Structures

This section provides an overview of the country's demography and of key political-economic parameters.

2.1. Social *and* political context

Ethiopia is an authoritarian regime ruled by the Ethiopian People's Revolutionary Democratic Front (EPRDF) since 1991. The country is undergoing a democratic transition following the 2018 appointment of Prime Minister Abiy Ahmed but it remains beset by political factionalism and intercommunal violence, allegations of abuses by security forces and violations of due process, and restrictive laws. The political context has direct impacts on many aspects of the research system.

The **World Bank** places Ethiopia towards the very bottom of a global ranking of government stability (percentile ranking of 8/100) and voice and accountability (10/100), reflecting the authoritarian nature of the government. The charity **Freedom House** finds that Ethiopia is 'not free' and gives the country an aggregate score for political rights and civil liberties of 19/100 (with 0 being least free and 100 being most free). The country scores 4/16 for freedom of expression and belief (where 0 is least free and 16 most free) but only 0/4 for academic freedom. In particular, the **2018 report** states that "the government has accused universities of being pro-opposition and prohibits political activities on campuses. There are reports of students being pressured into joining the EPRDF in order to secure employment or admission to universities; professors are similarly pressured in order to ensure favourable positions or promotions. The Ministry of Education closely monitors and regulates official curricula, and the research, speech, and assembly rights of both professors and students are frequently restricted". According to the World Bank, Ethiopia also has a weak rule of law (24/100), regulatory quality (14/100) and low government effectiveness (24/100). The country is ranked 114 out of 180 countries in the **Corruption Perception Index 2018**, reflecting perceptions of high levels of corruption. All the above indicators have been worsening over the past few years.

2.2. Economic context

Ethiopia is a country of almost 110 million people, the second most populous in Sub-Saharan Africa after Nigeria. In 2017 it had a GDP per capita of USD772, which is only about half the average for Sub-Saharan Africa and 30% less than the average for the least developed countries. Using the current World Bank **classification**,^a Ethiopia is a low income country. Overall, 27.3% of the country's population

^a Low income countries = \$995 or less; Lower-middle income countries = \$995 - \$3,895; Upper-middle income countries = \$3,896 - \$12,055; high-income countries = \$12,056 or more. In addition, the World Bank identifies

lives below the poverty line (calculated as USD1.90 a day): this is lower than the share of population living in poverty in more affluent Sub-Saharan countries (e.g. 53.5% of Nigeria's population lives in poverty despite the country GDP per capita being USD1,968), in line with the country's emphasis on **social protection** and **equality**. Ethiopia is ranked 173rd out of 189 in the world in the composite Human Development Index.

The country's economy relies on the service sector including tourism, retail and personal services for over 46% of national GDP. An additional 31% of national GDP is generated through agriculture and over 80% of the population lives in rural areas. This contributes to the country's digital divide, with less than 1% of the population having fixed-broadband internet subscriptions and average connection speeds of only 2 kilobytes per second. Considering mobile internet as well, the proportion of individuals with access to the internet is 15.3% compared to an average of 37.3% for Sub-Saharan Africa. Literacy rates are only 39%, also well below the average for Sub-Saharan Africa (64%). Ethiopia's manufacturing sector accounts for only 5.8% of the national GDP, and the country's competitiveness was ranked 108 out of 137 countries overall. The country's capacity to innovate is **below average**, indicating low to moderate economic dynamism.

3. Institutions

This section looks at the strength of the national policy framework. Specifically, it considers whether the country has a national research policy or strategy and whether it was updated in the last 10 years. It also looks at the existence of an innovation strategy and of national standards for research quality and practice.

3.1. National policy for research

Ethiopia's national policy for research is tightly linked to its development policy. The research agenda is set by each Ministry and ties into the five-year National Growth and Transformation Plan (NGTP) which focuses on investment in economic infrastructure, developing key sectors, with emphasis on the private sector. The Plan also focuses on science and technology – improving the quality of education and research, increasing enrolment, and supporting technology and research capacity development. The Ethiopian Government has published its Growth and Transformation Plan II (GTP II) which runs from 2015-20. Underpinning the plan is the principle of evidence-based policy, but informant interviews indicated that implementation is not fully understood or realised and that there is little activity in terms of policy monitoring or enforcement. Ethiopia does not have an overarching research policy. Instead, it relies on the National Science, Technology and Innovation Policy (STI Policy), which was published in 2012 as part of a broader national economic strategy, *Agricultural Development Led Industrialization*. Policy focus on scientific and technical disciplines is common

further groupings based on their average **GDP per capita**, which are useful reference points for this analysis: Low income = average \$787; Least developed countries = average \$1,072; Lower middle countries = average \$2,209; Middle income = average \$5,282; Upper middle = average \$8,610; OECD countries = average GDP \$45,721; High income = average \$47,892.

among Sub-Saharan African countries, but the implications for other disciplines remains unclear. The STI Policy establishes a direct link between economic policy and STI research, and it aims to create a technology transfer framework focused on “searching, selecting and importing effective foreign technologies in manufacturing and service providing enterprises”. The policy sees research organisations and the national research system as tools to deliver technology transfer goals in line with its broader development objectives. By contrast, higher education policy does not adequately cover research. Ethiopia’s most recent **Education and training policy** (1994) does not include any measure to promote research in higher education institutions despite recognising a nexus between education, training, and R&D. The **Government’s Higher Education Proclamation No. 650/2009** stipulates the legal role that institutions have in terms of conducting research, and creates a legal expectation that academic staff employed by a university will conduct research. Finally, Ethiopia’s draft **Education Development Roadmap** for 2030 acknowledges that research achievement is far below the country’s aspirations due to poor oversight of research applicability, scarcity of knowledge frontiers, and limited number of personnel available to conduct high quality and relevant research in the country’s HEIs. It proposes a series of changes in the university sector to build entrepreneurial skills, bridge the gap between industry and academia, develop research skills among students and increase the time academic staff spends on research and community services. It also recommends improving research infrastructure, promoting local scholarly journals, increasing universities’ research budget and supporting university-industry linkages. The recommendations are broad and few details are provided on how they could be implemented.

Overall, Ethiopia’s policy framework strength lies in its alignment with development policy. However, it is limited by the absence of a dedicated national research strategy. The consultation highlighted that policy aspirations are not yet translating into effective practical interventions and presently there is very little activity in terms of policy monitoring and enforcement at the organisation level because of limited coordination at a national level. For example, interviewees stressed the implementation of Ethiopia’s five-year strategic plan (NGTP) has been lacking and undermined by continuous civil unrest.

3.2. *National institutions for research*

The **Science, Technology and Innovation Policy 2012** establishes a governance structure for STI which includes:

- **National Science, Technology and Innovation Council (NSTIC):** chaired by Ethiopia’s Prime Minister, NSTIC prioritises and resources national technology capacity building programs, evaluates technology adaptation and utilization activities, identifies priority areas for capacity development and promotes synergies among all research actors.
- **Ministry of Innovation and Technology (MoIT):** the policy established the Ministry of Science and Technology (MoST) to coordinate, monitor and support STI development activities based on NSTIC strategic direction. In late 2018, MoST was replaced by the of Ministry of Innovation and Technology (MoIT)
- **Ministry of Science and Higher Education (MoSHE):** in October 2018, the Government cut the number of ministries from 28 to 20 but established the MoSHE as separate from both the

Ministry of Education and the MoIT (*proclamation number 1097/2018*). The MoSHE is responsible for leading the development of science, higher education as well as the technical and vocational education and training (TVET) in Ethiopia. At the time of writing it is still unclear what competences will fall under MoSHE.

Ethiopia has a centralized institutional framework for research, as NSTIC is chaired by the Prime Minister and all research-related funding is channelled by ministries. It is unclear whether mechanisms are in place to evaluate and monitor the effectiveness of policy implementation. The country has seen a rapid growth in the number of universities over the past two decades, reflecting the growing demand for higher education. However, universities appear to focus on teaching and learning over research, and there appear to be continued tensions with the government around academic freedom. The country benefits from the activity of influential public research institutes such as the Ethiopian Public Health Institute (EPHI) which has a clear mandate to influence decision-making in health policy. By contrast, there appears to be few independent (i.e. not government-controlled) think tanks, most of which are research wings of professional associations (e.g. the Ethiopian Economic Policy Research Institute (EEPRI)) and international NGOs. These are disconnected from the Government and are perceived by stakeholders to be of limited influence.

4. Agents

4.1. Stakeholder mapping

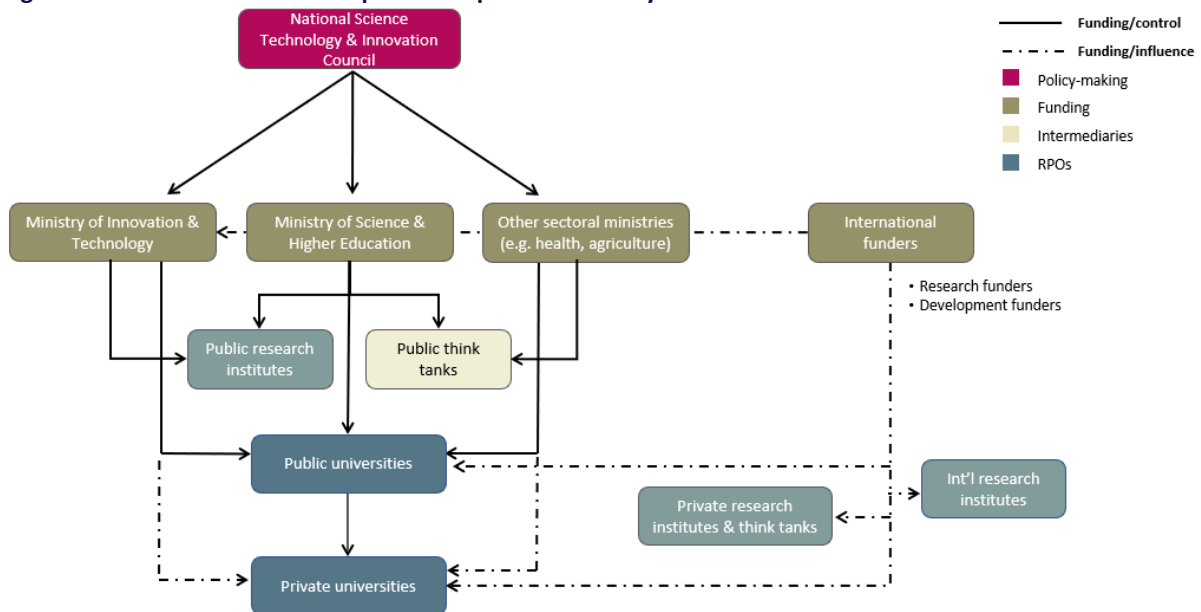
Publicly-funded organisations play a central role in Ethiopia’s research system (see Appendix B). As seen in the previous section, NSTIC and the MoIT are the main research actors in the country, but the competences of national research actors remain unclear. It is unclear whether MoIT has inherited competences on research from MoST or whether these are split with the new MoSHE. Sectoral ministries (e.g. Health and Agriculture) have the power to fund research, while Ethiopia’s Ministry of Education grants university status to qualifying institutions and is responsible for student admissions. Ethiopia’s MoSHE states that the country has 36 public, 4 private universities and around 60 private higher education institutions. Despite this however, there is variation in the reporting of university figures. The consultation process for example suggested that 26 universities were created since 2004 as a result of post-civil war investments in education organisation. There are however no research-intensive universities and very few have the resources to undertake research. Overall, Ethiopia does not have an extensive number of private and international think tanks, but it has a good number of public and private research institutes in the health sector. The country hosts several international stakeholders providing policy advice, technical assistance to the government and leading national research projects, and at least 10 international research funders appear to be active in Ethiopia. Appendix B lists the active stakeholders identified in this research.

4.2. Relations and interdependencies

At the national level, implementation of research policies would benefit from increased coordination. More research is needed to understand how communication and coordination function within

Ethiopia’s unique government structure (Figure 1 shows how policy is decided by NSTIC with ministries in charge for its implementation) and their impact on the government implementation capacity. The consultation reported that political tensions between ministries in terms of policy ownership are not uncommon, specifically with regards to the development of roadmaps for other ministries, and highlighted that the lack of coordination may be worsened by competing ambitions between ministries. Interviewees themselves showed some uncertainty around the roles and responsibilities of national actors.

Figure 1. Stakeholder relationships in Ethiopia's research system



5. Research production

This section discusses the factors necessary for research production within a national system. It considers three components of a research system:

- Research inputs, or the tangible assets that are directly connected with research production: human resources, financial resources and infrastructure.
- Research culture and support, or the enabling environment for research.
- Research outputs, including the products of research and the incentives for producing research.

5.1. Research inputs

A. Human capital

Ethiopia hosts a relatively low number of researchers (45 per million people) in comparison to the African average of 95.1 researchers per million of the population. Just over half of Ethiopia’s researchers are employed by government (56.4%) and 40.6% of researchers are employed in higher education in the country. The remaining population of researchers are split between the private and non-profit sector (2.5%) and business enterprise (0.5%). 13% of researchers in Ethiopia are female

which compares poorly against the Sub-Saharan African average of 31.6% female researchers. This is the lowest percentage of female researchers across all Sub-Saharan countries in this study.

Research skills and experience are identified as a barrier to the development of Ethiopia's research system. For example, 16.7% of researchers are educated to PhD level or equivalent, compared to countries like Ghana and Nigeria where over a third of researchers progress to this level according to UNESCO data. The proportion of researchers with PhD qualifications or equivalent is lower than all other countries considered in this study, aside from Kenya where 6.1% of researchers have a PhD or equivalent qualification. The lack of formal training may hamper research quality and the government is making additional efforts to change their researcher profile. For example, 20% of MoIT's budget is set aside to recruit and train women in research, but the small research budget means that the ministry relies strongly on external and international donor funding to implement activities with very little scope remaining to train and retain researchers.

B. Research funding

Ethiopia had a Gross domestic Expenditure in Research and Development (GERD) of 0.6% in 2013, up from just 0.17% in 2007. While still considerably lower than the 1% target set by African Union (AU) members, Ethiopia's GERD is almost 50% higher than the average for Sub-Saharan Africa and three times the average for low income countries. Moreover, the expenditure has quadrupled between the years 2007 and 2013, indicating a commitment to improving the national research environment on the part of the government. Around three quarters of the national GERD is performed by the higher education sector, with the government being directly responsible for the remaining quarter. By contrast, the business sector was reported to have performed just 1.2% of the total expenditure in R&D, reinforcing the idea of a highly centralized and public sector-focused research sector which may have its roots in the country's recent communist history. This compares with over 60% of R&D in scientific and technical fields being performed by businesses in OECD countries, marking a distinct lack of private sector input in the country's research and innovation capacity (see Table 3).

Ethiopian national research funders provide two types of funding. First, government funding of up to 1.5 million Birr (around GBP 41,000) per project is provided to leverage international grant funding on thematic areas aligned with national priorities. 70% of government funding goes towards science and technology and 30% towards humanities. Second, the government runs an adaptive scheme aimed at junior faculty members (see section 5.2), with a budget of 100,000 Birr (circa GBP 2,700). About 40% of universities (14) receive this money, which must be used for research relating to one or more of the Government's 36 priority policy areas, as outlined in the Growth and Transformation Plan II.

Surprisingly, only 2.1% of Ethiopia's GERD comes from abroad (compared with, e.g., 31% in Ghana and 52% in Tanzania). This includes 300 million Birr (circa GBP 8.2 million) that were raised from international sources to support 27 research projects, largely in the natural and medical sciences. The low figure is especially surprising considering that stakeholders at MoIT indicated a strong reliance on external/international donor funding to implement activities, which is consistent with the interviewees' perceptions. While it is possible that the large gap between Ethiopia and other countries is also due to the way outside expenditure is accounted for (e.g. there may be an insistence that funding from abroad be managed by the government and thus it may not be accounted for in the

same way as project-based funding), it cannot be excluded that international stakeholders overall are spending less in Ethiopia than in other Sub-Saharan African countries.

C. Research organisations

Ethiopia has a rapidly growing network of research organisations comprising 33 universities and a number of public and private research performing organisations such as research institutes and think tanks. Up until 1991, Ethiopia had only 2 universities – Addis Ababa University (AAU) and Haramaya University. Between 1992 and 2009, a further 19 universities were formed, followed by an additional 12 between 2010 and 2013 according to Ethiopia’s **Ministry of Science and Higher Education**. A legal requirement set by Ethiopia’s Government requires all universities to conduct research. At AAU for example, staff are expected to spend at least 25% of their time conducting research. In reality however, the significant lack of funding and resources means this is often not the case. Research capacity is limited in Ethiopian universities by a number of factors including a lack of funding and coordination at the national level, academic brain-drain and insufficient capacity for training of new researchers. The **World Economic Forum** gives a low rating to the average quality of research institutions (Ethiopia is ranked 85th out of 137 countries), and no university in Ethiopia is ranked among the first 1,000 in the world. Seven Ethiopian universities appear in **Scimago’s institutional rankings**. The highest ranking of these institutions is the University of Gondar (11th out of all ranked African institutions), however, Gondar only ranks 666th worldwide. Due to constraints in capacity, universities tend to focus on local issues and very much on learning and teaching over research. Research in Ethiopia is therefore led almost exclusively by dedicated research institutes which maintain a national remit and generally for the purpose of informing national policy, such as EPHI. These specialised centres are operating primarily in the areas of health and agriculture.

5.2. Research culture and support services

A. Research culture

The consultation indicated that a positive attitude towards research-driven evidence-based decision-making has developed since the 2000s, but the government’s enthusiasm for research is not widely shared by universities, most of which are largely teaching-oriented. In order to address this, the Ethiopian government requires all university staff to conduct research and expects research production to be a requirement for career progress. Some universities are responding to the government’s directive. For example, from September 2019, staff at AAU will be required by the Senate to publish at least one article every two years that is produced with at least five co-authors. “Publish equals promotion” as the basis for academic career advancement does not appear to have produced a wider change of attitude among academics. Tensions between the educational and research mission of universities, reported limits to academic freedom, persistent underfunding and unclear career paths for academics have undermined progress in research production.

B. Capacity building

Academics are not incentivised to pursue research as a career path, while universities are generally underfunded and have insufficient capacity for training new researchers. Just like in many other African countries, academic brain-drain is a significant barrier to research capacity.

As discussed in section 5.1, the Government provides grants of up to 100,000 Birr for adaptive research projects, which work as a training budget for early career researchers to gain practical experiences in managing research projects. Other than this scheme, the consultation did not highlight any national research capacity strengthening (RCS) activities. Funding for research capacity development is generally included in the budget for the research project, and it is perceived by interviewees as being very limited overall. The Ministry relies on external/international donor funding for research capacity strengthening (RCS), but international interventions in the country seem more limited compared to other Sub-Saharan countries thus creating a gap.

C. Research support and administration

Research management offices only exist in some of the bigger universities, but even those institutions do not have enough capacity. AAU has a research office (RO) funded by charging 8-12% overheads to research projects. The RO, which is responsible for grant management, implementation of research incentives and funding schemes, capacity building, data management, assisting with sourcing of external funding, financial management and reporting to funders, has only three people. Moreover, there is little awareness of the research and innovation management associations and the role they can play in supporting research management in universities.

In order to develop skills within the university amongst researchers, AAU's RO has partnered with the University of Gothenburg to provide training in grant writing and research ethics as part of a "train-the-trainer" programme funded by the Swedish International Development Cooperation Agency (SIDA). They have also signed a Memorandum of Understanding with the University of Bath for training on how to provide research support and administration in social sciences and humanities. Moreover, the larger universities are beginning to invest in their own Current Research Information System (CRIS) which supports institutional grant management and is also used as the institution's publications repository. AAU partnered with Thompson Reuters to create a system that allows researchers to upload research proposals and automatically calculate publication impact factors.

D. Digital infrastructure and data

Ethiopia's digital research infrastructure is lacking. The country is ranked 125th out of 137 for access to the internet: only 11.6 % of the population has access to the internet and just 0.6% have a fixed-broadband subscription according to the [World Economic Forum](#). Against this backdrop, under-investment in digital research infrastructure is perhaps unsurprising. One interviewee stated that the government is yet to be convinced of the value of research infrastructure, since most universities undertake small-scale research at a local level.

The picture for research data is not better. Ethiopia does not have a national repository for research data, and most universities lack institutional repositories too. Interviews revealed that the MoIT is in the process of developing a national repository for research data, but there is no firm date. Some institutions have been able to tap into international funding to start building their research infrastructure. For instance, EPHI launched an institutional data management system that allows experts to analyse and translate data into useful formats, and recently received funding from the Gates Foundation to create a [National Data Management Center for Health](#). The system will be a central repository for research which policymakers can access, thus allowing the effective tracking of research influence and policy implementation.

5.3. *Research output and evaluation*

A. Research publications

Ethiopia has a relatively high production of research literature in comparison to other Sub-Saharan countries considered in this study. In 2018, the country produced 3,514 publications, equating to 33 publications per million people. In the same year, Ethiopia produced 4.57% of Africa's total research outputs and 0.11% of the global research output, ranking behind much smaller countries. Over the past decade, the number of publications per thousand people in Ethiopia has remained fairly low. In 2018, 54.33% of Ethiopia's publications were open access.

Using citation-related metrics, the quality of scientific publications in Ethiopia appears below the average of the countries considered in this study. Ethiopia's h-index (a measurement of both the productivity and citation impact of scientific publications) ranked the country as 88th out of 156 in terms of research productivity and citation impact. Between 1996 and 2018, the average publication in Ethiopia received 10.96 citations between 1996-2018. According to Scimago, Ethiopia ranked 153rd out of 236 countries in terms of the number of citations per paper. International collaborations accounted for 58% of Ethiopia's research outputs in 2018, this decreased from 62% in the previous year and is substantially lower than many other Sub-Saharan African countries (e.g. Kenya and Ethiopia both have more than 80%). Informant interviews however emphasized that Ethiopia's current focus on strengthening partnerships outside of the country (see section 5.1) has acted as a disincentive to researcher collaborations within the country.

B. Research evaluation & ethics

There are few incentives for researchers to collaborate within Ethiopia. Academics are expected to undertake research and publish in order to be promoted, but the focus is often on strengthening partnerships outside of the country. Stakeholders expressed the view that, after an initial focus on research production (quantity), the government has more recently started to emphasise research quality. However, no evaluation mechanisms for research quality are currently in place and therefore there is no basis to establish whether the policy ambition is being realised. By contrast, Ethiopia has a National Research Ethics Review Committee which falls under MoIT. The Committee has published the [national research ethics guideline](#), last updated (5th edition) and published in 2014. Large universities have internal research ethics review boards.

6. Research diffusion

This section focuses on the stakeholders and practices underpinning the diffusion of scientific research in the country.

6.1. *Actors and networks*

A. National users of research

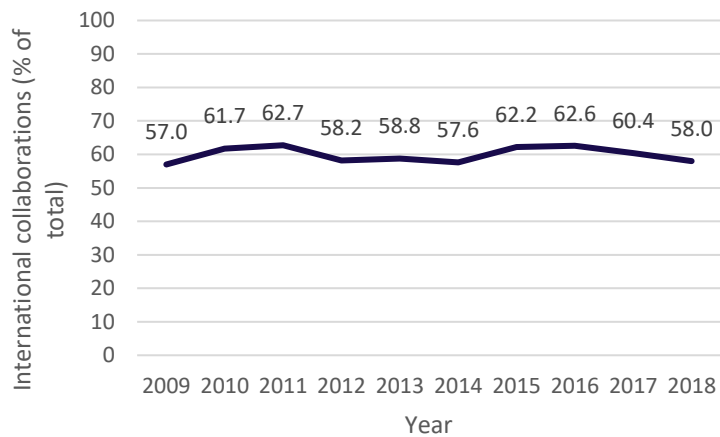
Despite the STI policy's emphasis on technology transfer, Ethiopia has still some way to go in terms of technology readiness. According to estimates from the [World Economic Forum](#), the country scores 3.6 out of 7 for foreign direct investment (FDI) and technology transfer and 3.3/7 for firm-level technology

absorption, indicating a low capacity in making use of latest technologies to modernize production and distribution of goods and services. Overall, this reinforces the impression of Ethiopia as a difficult place to do business. It also appears that, despite its central position in the research landscape, the government is not driving R&D development in the way proposed by the STI policy. Aside from its limited procurement of technology products, interviews revealed little evidence to suggest that the government makes regular use of research outputs or information products.

B. International exposure

Ethiopia’s international exposure is measured by looking at the diffusion of its best scholarly production (measured as the percentage of papers in the 10% most-cited papers in a field of research) and by looking at the number of international collaborations. 6.3% of Ethiopia’s papers are among the **10% most cited** in a discipline or field, reflecting a lower-than average contribution to high-quality international scholarship (if one, that is, accepts the correlation between citations and quality). **58% of the papers** produced in 2018 came from international collaborations, and the proportion has been relatively stable over the past 12 years (it was around 55% in 1996). This is a lower proportion than other Sub-Saharan countries, but it also reflects a less dominant role for international research funders. International research collaborations are primarily with institutions based in the US, UK, Germany, India and Belgium.

Figure 2. International collaborations in scientific publications (% of total)



6.2. Knowledge exchange practices

A. Intellectual property

Ethiopia has a national body for the protection of intellectual property, the Ethiopian Intellectual Property Office (EIPO). EIPO engages with universities and research centres and manages the collection of royalties through the Ethiopian Copyright and Neighbouring Rights Collective Management Society (ECNRCMS). EIPO is a member of the World Intellectual Property Organisation (WIPO), but not of the African Regional Intellectual Property Organisation (ARIPO). The country also recently established an advisory board called the National Intellectual Property Council. Ethiopia has a draft IP policy, which was under review by WIPO and

needs to be ratified through the Council of Ministers. Despite the lack of a finalised policy, the IP Office has processes and systems in place to handle patent applications. However, according to WIPO data, Ethiopia does not appear to have filed any patent domestically over the last 10 years, either from nationals or from foreign residents. By contrast, 19 patents were filed in foreign countries by Ethiopian nationals in the last 10 years. This compares very negatively even with other low-income countries. Ethiopia is ranked 115 out of 119 countries and 19 out of 21 Sub-Saharan African countries for the number of patents.

Figure 3. Number of patents filed in Ethiopia.



B. Knowledge exchange support and administration

At the national level, there is a clear expectation that universities be entrepreneurial in their outlook. This is evidenced in the Government’s Proclamation No. 650/2009 and, more broadly, in the STI policy’s emphasis on technology transfer. However, there is no national body that supports innovation and technology transfer at the national level. Universities are increasingly ‘entrepreneurial’, although only large research-intensive institutions have technology transfer offices (TTOs). The AAU has an Industry Linkage and Technology Transfer Office as well as an Office of Community Services focused on implementing research outputs within the local community. Both Offices, together with the Research Office, fall under the same department, which allows for better coordination. The TTO’s primary function is “the incubation of research ideas, identify IP, provide support for prototype development to attract investors”. Ethiopia ranks 47 in a list of 137 countries for university-industry collaborations, but businesses underinvest in R&D (see section 5.1).

7. Needs assessment

This section summarises the overall score of each component of the research system using a 7-point scale (see Appendix A). Research system component scores are calculated as an average of all indicator scores within it (see Table 4). All research system components are assigned a component ID (see Table 1). The aim of this exercise is to show which components are most deficient. However, there is no exact equivalence between a low score for one component and identification of needs since different components have a different impact on the system. Section 8 discusses other considerations that influence the choice of priorities for action, such as the feasibility of interventions.

In the last two decades, Ethiopia's research system has been playing catch-up. The government has recognised the importance of science and technology for development, but universities are not providing a contribution to research production commensurate to the government's ambition. The government has made efforts to integrate research and STI policies within its development planning, but progress is hampered by a challenging social and political environment (RSC1). Political instability, poor regulatory quality and government threats to academic freedom create an unfavourable social and political context (2.2/7). Research funding is naturally limited in a country with a GDP per capita below the average of the least developed economies (RSC2, 1.8/7). Ethiopia has a rural economy with high illiteracy and an underdeveloped digital infrastructure, but competitiveness is improved by the government emphasis on innovation as a development driver. Ethiopia has a development-focused STI agenda but lacks a bespoke national policy for research, research quality standards and capacity to implement, monitor and evaluate policy (RSC3 4.3/7). Whilst research seems embedded in the development agenda of Ministries and other major national actors, excessive centralisation, lack of resources and political instability constrain the effectiveness of its young institutional framework for research (RSC4, 3.5/7). Centralisation brings coordination, clear decision-making and accountability, at least on paper, but a dearth of non-governmental research actors and low stakeholder participation in policy are major barriers to a thriving research environment (RSC5, 3.8/7).

The rapid growth in the number of universities is not yet matched by a commensurate growth in research capacity (RSC6, 2.1/7), and the country has a notably low number of researchers working in the business sector. The national GERD is low but in line with LMICs, and expenditure is depressed by low R&D investment from the business sector and a low contribution of international donors (RSC7, 2.25/7). Whilst the average quality of higher education institutions is just below average, Ethiopia's universities do not appear to have an international research profile (RSC8, 2/7) and research capacity is hampered by lack of funding (RCS7, 2.3/7) and lack of research support (RCS11, 2.7/7). As a result, most research is undertaken by government-linked, non-academic organisations. Research capacity strengthening is minimal (RCS10, 2.7/7), and this is compounded by low donor engagement in this area. Ethiopia has shown great progress with regards to its contribution to scientific literature (RCS13, RCS14 3/7), spurred in part by a 'publish equals promotion' policy that is seen by some as too harsh on under-resourced researchers. Scoring 4/7, the country's research publications have average international exposure (RCS16). Nationally, Ethiopia boasts fairly good mechanisms for knowledge exchange (RSC18, 5.4/7) but there does not seem to be sufficient demand for research products and information from government and business (RSC15. 3.3/7).

Table 1. Scoring of research system components

Section	Research system component	Score	Component ID
National context	Social and political context	2.2	RSC1
	Economic context	1.8	RSC2
	Section average	2.0	-
Policy and institutional framework	National policy for research	4.3	RSC3
	National institutions for research	3.5	RSC4
	Stakeholder composition & relationships	3.8	RSC5
	Section average	3.9	-
Research inputs	Human capital	2.1	RSC6
	Research funding	2.3	RSC7
	Research organisations	2.0	RSC8
	Section average	2.1	-
Research culture and support	Research culture	4.0	RSC9
	Capacity building	2.7	RSC10
	Research support	2.7	RSC11
	Infrastructure and data	2.5	RSC12
	Section average	3.0	-
Research outputs and evaluation	Research publications	3.0	RSC13
	Research evaluation	3.0	RSC14
	Section average	3.0	-
Knowledge exchange (KE) actors and networks	National users of research	3.3	RSC15
	International exposure	4.0	RSC16
	Section average	3.6	-
KE practices	Intellectual property	3.0	RSC17
	KE support and administration	5.4	RSC18
	Section average	4.2	-

8. Recommendations

8.1. *Identification of priorities*

This section identifies options for research capacity strengthening in Ethiopia by looking at the worst-performing indicators and considering their overall impact on the research system and their tractability, or the feasibility of external interventions in that area. Three areas appear important:

- **Establish thematic centres of excellence in priority areas.** Ethiopia has clear needs across all the inputs needed for research production – human capital, funding and infrastructure. The underdeveloped status of the research system, political instability and ongoing tensions between government and universities make it difficult for donors to embark in system-level interventions. Instead, it may be beneficial to work with more research-oriented universities to establish thematic centres of excellence that operate in one or more of the priority areas identified in the National Development Plan. Activities could focus on building research culture, capacity, infrastructure and

good management practices at school/faculty level. This type of intervention is working elsewhere in Africa (see the World Bank-funded [ACE programme](#)) but there is nothing like this in Ethiopia.

- **Strengthen policy implementation capacity.** While the Ethiopian government is committed to research, policy implementation remains lacking. Donors could build government capacity to translate policy aspirations into clear KPIs, and to set up monitoring and evaluation (M&E) systems. Focus on policy implementation capacity might create opportunities to promote more stakeholder involvement as a way of lowering implementation and monitoring costs, and space to discuss the coordination problems affecting ministries. Once M&E is established, this would also create an opportunity to introduce research quality standards and incentives for research production.

- **Invest in knowledge exchange.** The Ethiopian government has indicated a willingness to invest in knowledge exchange activities. However, the consultation process found that the country does not have the knowledge and skills to commercialise research. If there is an investment in thematic research centres, then a natural extension of that intervention could be to also invest in supporting the use of research products (including through commercial means). External donors could work to build technology transfer capacity and establish good practice in the dissemination of research to social and economic actors. Partnerships between Ethiopian and UK universities could be a promising way forward. Establishing a connection between users and producers of the research is also likely to support internal demand for research, potentially creating positive reinforcement for national investments in research.

8.2. Conclusions

The Needs Assessment has indicated that Ethiopia receives considerably less financial support for research compared to other LMICs. Given the authoritarian nature of the government and ongoing conflicts between the executive and academia, donors may find system-level interventions difficult. However, the government has indicated a desire to attract international research funding to support its development plan, and funders will have some leverage on a fast-growing but cash-strapped country. Collaborations with the government should build on the national development priorities identified by the government and seek to fit within current strategies for research and technology transfer.

At the same time, organisation-level interventions will be arguably more impactful in Ethiopia than they would be in more advanced LMICs. The rapid growth in the number of universities and the number of students creates both challenges and opportunities for RCS. We recommend that priority be given to collaborations with established universities that are already engaged in research, with a view to creating national role models for research production and management. Given the government's appetite for practical research and its ambitious (albeit aspirational) policy goals, these interventions could help legitimise research as a priority goal for an elite group of research-focused universities in a two-tier system dominated by teaching-oriented institutions.

A sandwich approach, where international donors are seen to be working both with the government and with organisations (but always within priority areas defined nationally) is likely to be the best approach to navigate the complex political circumstances Ethiopia is experiencing. Moreover,

interventions will have to be carefully planned and negotiated over time to navigate the institutional complexities of the research system. This can create the opportunity for engaging stakeholders that might otherwise be side-lined in a centralised research environment.

Appendix A – Full list of indicators and scores

Table 2. How to read the scales

	1	2	3	4	5	6	7
Qualitative indicators	Very poor	Poor	Somewhat poor	Neither poor nor good	Somewhat good	Good	Very good
Quantitative indicators	Very low	Low	Below average	Average	Above average	High	Very high

Table 3. Score conversion table

Data type	Description	Score conversion
Absolute country rank	Country ranks are converted to scores by dividing the total number of countries ranked in seven groups of equal size and then positioning the country in one of the seven groups.	Variable based on number of ranked countries
Country scores (1-7)	A number of indicators have already been scored on a 1-7 scale. Decimal numbers will be rounded up or down to their closer whole number.	Maintained (rounded)
Country score (1-16)	Freedom House (FH) scores freedom of expression and belief from 1 to 16. We convert the score to 7, but consider performance of the sub-rating “academic freedom” when rounding up the overall score for freedom of expression.	FH score 1-2 = Needs Assessment score 1; 3-5 =2; 6-7 =4; 8 =5; 9-10 =6; 11-16 =7
Percentile score / percentile rank (1-100)	This scale uses a 1-100 score, generally with 0 indicating the lowest score and 100 the highest (in a few cases, 0 is the best score and 100 the worst). Scores are divided in 7 groups, and the score is given depending on what group a country falls under. Note that percentile score is expressed differently from the percentage value (%) which indicates quantity.	Original score 1-14 = Needs Assessment score 1; 15-28 = 2; 29-43 = 3; 44 – 58 = 4; 59-72 = 5; 73-86 = 6; 87-100 = 7.
University rankings	A score is assigned based on the position in the combined position on the global rankings of the country’s top three universities (sum of individual rankings divided by three).	1-500= 7; 501-1000= 6; 1001-2000= 5; 2001-3000= 4; 3001-5000= 3; 5001 -8000 =2; 8001+ =1
Percentage values	Indicators such as literacy rates, access to internet etc are measured with percentage values (%). For percentages, scores are given based on a country’s performance relative to other countries.	Relative to other countries’ performance
Yes/No	Some indicators are scored using a binary system, e.g. whether a country does or does not have a research strategy. Where additional qualitative evidence is available, this will be reflected in the	When no additional qualitative evidence is available:

Data type	Description	Score conversion
	score. Where no additional evidence is available, Yes is equated with the median point of the high rating (6) and No is scored with the median of the low range (2).	Yes = 6 No = 2
GERD per capita	We use the 1% African Union target as best outcome (score 7), and modify the score based on the actual GERD. GERD higher than 1% is scored 7.	GERD 0-0.2% = score 1; 0.3-0.5% =2; 0.6-0.8% =3 0.9-1.1% =4; 1.2-1.4% =5; 1.5-1.7% =6; 1.8-2% =7
GERD funding from abroad	The extent to which external funding in R&D is seen positively or negatively depends on many factors. For instance, foreign investment in business R&D is seen as a positive tech transfer opportunity, whilst excessive dependence on foreign funding in HE R&D is rated negatively. Based on existing studies , we take 35% as an optimal value for GERD from abroad for LMICs. Deviation from optimal value is rated negatively.	Deviation (+ or -): 0-5% =7; 6-10% =6; 11-15% =5; 16-20% =4; 21-25% =3; 26-30% =2; <31% =1
GERD by sector	We use the following GERD distribution as optimal (based on a slightly modified distribution from the OECD estimate to take into account LMICs unique circumstances): business enterprise = 50%; HE = 25%; government = 15%; non-profit = 10%. Deviation from this distribution is rated negatively.	Total deviation: up to 20% = 7; 21-35% = 6; 36-50% =5; 51-65% =4 66-80 =3; 81-95 =2; <96% =1
N. of journals in Scimago	A high number of local journals is positively correlated with research diffusion.	0-5 journals =1; 6-10 =2; 11-20 =3; 21-30 =4; 31-40 =5; 41-50 =6; <50 =7
Internet speed	We consider internet speeds of around 2MB per second sufficient to browse the net for research, considering download and upload times for documents (score 4). Lower speeds are insufficient for any research activities, higher speeds are necessary for data-intensive research.	0-500kb/s =1; 501-1MB/s =2; <1-2MB/s =2; <2-5MB =4/ <4-10MB/s =5; <10-15MB/s =6; <15MB/s =7
Country income classification	The World Bank identifies further groupings based on their average GDP per capita : Low income = average \$787; Least developed countries = average \$1,072; Lower middle countries = average \$2,209; Middle income = average \$5,282; Upper middle = average \$8,610; OECD countries = average GDP \$45,721; High income = average \$47,892.	Low income = 1; Least developed = 2; Lower middle = 3; Middle income = 4; Upper middle = 5; High income = 6; Very high income = 7
Poverty	The score is based on the % of population living with less than \$1.9/day, using World Bank data .	40% or more =1; 25-39% =2 15-25% = 3; 10-15% =4; 9-5% =5; 1-3% =6; less than 1% =7
Urban/rural divide	We assume that there is a positive correlation between the proportion of people living in cities and research. We see a proportion of urban v rural dwellers above 50% as optimal, while lower proportions are rated negatively.	1-10%=1; 11-18%=2; 19-26% =3; 27-34% =4 35-42%=5 43-50%=6; >51%=7
Literacy rate	Low literacy is negatively correlated with research. Given the international standards of literacy, we weight low literacy more heavily than relatively high literacy and only give full score to those countries where almost all the population is literate.	1-20%=1; 21-40%=2; 41-60%=3; 61-75%=4; 76-85%=5; 86-95%=6; 96-100%=7

Table 4. Ethiopia research system performance.

COMPONENT	INDICATOR	VALUE	SCORE	DETAILS	SOURCE
National context					
Social and political indicators (RSC1)					
Social and political factors	Working language	Amharic	-	No direct impact on research performance	[1]
	Total population	109.2 million	-	No direct impact on research performance	[2]
	Urban population (% of total)	20%	2	Ethiopia has a low proportion of urban dwellers, which is negatively correlated with HE and research	[2]
	Type of government	Authoritarian	-	No direct impact on research performance	[3]
	Political stability	8/100	1	See table 3. Score goes from 0 (worst) to 100 (best)	[4]
	Rule of law	24/100	2	See table 3. Score goes from 0 (worst) to 100 (best)	[4]
	Regulatory quality	14/100	1	See table 3. Score goes from 0 (worst) to 100 (best)	[4]
	Government effectiveness	24/100	2	See table 3. Score goes from 0 (worst) to 100 (best)	[4]
	Voice and accountability	10/100	1	See table 3. Score goes from 0 (worst) to 100 (best)	[4]
	Corruption (ranking)	114/180	3	See table 3. Ranking goes from 1 (best) to 180 (worst)	[5]
	Access to information	112/150	6	See table 3. Score goes from 0 (worst) to 150 (best)	[6]
	Freedom of expression	4/16	2	See table 3 and section 2.1	[3]
	Adult literacy rate (% population aged 15+)	39%	2	Literacy rates are lower than the global average.	[7]
Gender Development Index	0.846	3	Women's achievements in health, education and command are lower than men's, underlying gender inequality in line with the African average.	[8]	
Economic indicators (RSC2)					
Economic development	GDP per capita USD	\$772.3	1	Lower than the average GDP for sub-Saharan African countries. See table 3.	[9]
	Agriculture, value added (% of GDP)	31.1%	-	No direct impact on research performance	[9]
	Manufacturing, value added (% of GDP)	5.8%	-	No direct impact on research performance	[9]
	Population living in poverty (\$1.9/day)	27.3%	2	See table 3	[9]
Digital infrastructure	Access to internet (ranking)	125/137	1	See table 3	[10]
	Individual using Internet/100 people	11.6/100	-	Scored under access to internet.	[10]
	Broadband internet subscription/100 people	0.6/100	-	Scored under access to internet.	[10]
	International internet bandwidth, kb/s per user	2.2	1	Broadband speed is very low and inadequate for data-intensive research. Ethiopia's broadband speed is significantly below average for Sub-Saharan Africa.	[10]
	Mobile internet subscriptions/100 pop	5.3/100	1	Mobile internet subscriptions are very uncommon and not widespread across Ethiopia.	[10]

COMPONENT	INDICATOR	VALUE	SCORE	DETAILS	SOURCE
Competitiveness	Global Competitiveness Index (ranking 2018)	108/137	5	See table 3	[10]
	Overall technology readiness	2.4/7	2	See table 3	[10]
	Capacity for Innovation	3.5/7	4	See table 3	[10]
	Innovation index (score)	24/100	2	See table 3	[11]
Policy and institutional framework					
National policy for research (RSC3)					
National policies	Existence of a national research policy	Partly	3	The country has a STI policy but not a research policy. See section 3.1	Various
	Existence of sector-specific research policies	YES	6	MoIT leads on the development of the R&D agenda for other Ministries' development plan	Interviews
	Research policy updated in the last 10 years	Partly	4	STI policy published in 2012. See section 3.1	[11]
	Existence of an <u>appropriate</u> Strategy for STI	YES	6	See section 3.1	Interviews
	Capacity development is part of the Strategy	YES	5	An element of all government funding is ring-fenced for capacity building; however, government funding is limited. Impact is minimal due to limitations in resources.	Interviews
	Country has <u>appropriate</u> indicators tracking R&D	YES	2	See section 5.2	Interviews
National institutions for research (RSC4)					
National institutions	The country has a ministry or department for research	NO	3	The Ministry of Innovation and Technology for research. See section 3.2	Interviews
	The ministry/department for research is sufficiently resourced	-	4	We have no evidence to suggest yes or no.	Interviews
	The country has one or more national research funders	NO	2	Ethiopia has one national research funder – the Ministry of Innovation and Technology.	Interviews
	The research funders have sufficient financial resources	NO	2	Interviews clearly suggested that the Ministry of Innovation and Technology is insufficiently resourced.	Interviews
	Quality of the research funder management capacity	Neither good nor bad	4	Institutional instability and the lack of dedicated research funding limit effectiveness	Interviews
	The country has a national research ethic body	Good	6	See section 5.3	Interviews
Stakeholder composition and relationships (RSC5)					
Stakeholder composition	Clarity of relationships between national actors	Good	4	High-level coordination, but unclear relationship between ministries	Interviews
	Clarity of decision-making and accountability	Good	5	The Ministry of Innovation and Technology is linked to	Interviews

COMPONENT	INDICATOR	VALUE	SCORE	DETAILS	SOURCE	
	processes			all decision-making and policy development in Ethiopia.		
	Level of coordination between government department	Neither good nor bad	4	See section 4.2	Interviews	
	Cohesion between policy mechanisms	Neither good nor bad	4	Cohesion is strong on paper, but there is a lack of skills and resources to implement policy. See section 4	Interviews	
	Level of participation in decision-making/standard-setting	Below average	3	Good participation from public think tanks, little input from independent think tanks.	Interviews	
	Quality of monitoring & enforcement mechanisms (M&E)	Somewhat poor	3	See section 3.2	Interviews	
Research inputs						
Human capital (RSC6)						
Human capital	Total R&D personnel per million people (FTE)	121.2	3	See table 3	[12]	
	Researchers per million inhabitants (FTE)	45	3	See table 3	[12]	
	Researchers (FTE) - Business enterprise	0.5%	1	See table 3	[12]	
	Researchers (FTE) - Government	56.4%	2	See table 3	[12]	
	Researchers (FTE) - Higher education	40.6%	4	See table 3	[12]	
	Researchers (FTE) - Private non-profit	2.5%	1	See table 3	[12]	
	Researchers (FTE) – Female	13%	1	See table 3	[12]	
	Researchers (FTE) with ISCED 8	16.6%	2	See table 3	[12]	
Research funding (RSC7)						
Research funding	Total GERD (in current PPP\$)	787,274		See section 5.1	[12]	
	GERD per capita (%GDP)	0.6%	3	See table 3	[12]	
	GERD per researcher FTE (in current '000 PPP\$)	\$184.5	4	See section 5.1	[12]	
	GERD financed by abroad (% total)	2.1%	1	See table 3	[11]	
	GERD performed by	business (% total)	1.2%	1	See table 3	[12]
		gov (% total)	24.5%			[12]
		HE (% total)	74.1%			[12]
private non-profit (% total)		0.2%	[12]			
Research organisations (RSC8)						
Research organisations	Average quality of research organisations	85/137	3		[10]	
	Global ranking of University of Gondar	666/3471	6	See table 3	[13]	
	Global ranking of Addis Ababa University	689/3471		See table 3	[13]	
	Global ranking of Jimma University	704/3471		See table 3	[13]	
Research culture and support						

COMPONENT	INDICATOR	VALUE	SCORE	DETAILS	SOURCE
Research culture (RSC9)					
Research culture	Perceptions of the utility of research	Above average	5	On the rise based on GERD increase and national STI policy. See sections 3.1 and 5.1	Various
	Time allocated to research	Low	3	See section 5.2	Interview
Capacity building (RSC10)					
Capacity building	Overall research training capacity	Very low	2		
	Local availability of specialized training services (not research specific)	3.9/7	4		[10]
	Funding for Research Capacity Strengthening	Poor	2	See section 5.2	Interview
	% HEI with PhD programmes	N/A	-	N/A	-
Research support (RSC11)					
Research support	Level of access to proposal writing support	Poor	2	See section 5.2	Interview
	Existence of institutional policies	Neither poor nor good	3	At the ROs we visited, there are policies in place but given the issues vis-à-vis capacity at universities, again it is unlikely that these exist (or enforced where they do exist). Likewise, dedicated staffing is in place at AAU and research institutes but unlikely to exist across the wider sector.	Interview
	Quality of administrative support	Neither poor nor good	3		Interview
Infrastructure and data (RSC12)					
	Is there a central repository for research data?	NO	3	A central repository of research data is under development	Interview
	Quality of research infrastructure	Poor	2	See section 5.2	Interview
Research output and evaluation					
Products of scientific research (publications and patents) and incentives for producing research					
Research publications (RSC13)					
Research publications	Total # of publications (2018)	3,514	-	Not scored, depends on population size	[14]
	Publications per million people	32			
	Total # of citable publications	3,223	-	Not scored, dependent on population size	[14]
	Citations per publication (1996-2018)	10.96	-	Scored by citation per publication ranking	[14]
	Citations per publication ranking (1996-2018)	153/239	3	See table 3	[14]
	H index ranking	101/136	5	See table 3	[14]
	# Journals listed in SciMago	4	1	See table 3	[14]
	Scimago country ranking 2018	77/239	2	See table 3	[14]
Percentage of papers in 10% most-cited papers	6.3%	3	The G20 average is 10.2%	[15]	

COMPONENT	INDICATOR	VALUE	SCORE	DETAILS	SOURCE
	(2008–2012)				
	% of total publications for Africa	4.57%	-	Positive output, doubled the share of outputs since 2011. Not scored.	[14]
Research evaluation (RSC14)					
Research evaluation	Existence of national mechanisms for research quality evaluation	NO	2	There are no accepted national standards for research quality and practice in Ethiopia.	Interview
	Quality of incentives for research production	Somewhat poor	4	See section 5.	Interview
Knowledge exchange (KE) actors and networks					
National users of research (RSC15)					
National users of research	Firm Level Technology absorption	3.3/7	3		[10]
	FDI and Technology Transfer	3.6/7	3		[10]
	Gov't procurement of technology products	3.6/7	3		[10]
	Government use of research information/products	Low	3	See section 6.1	Interview
International exposure (RSC16)					
International exposure	International collaboration 2018 (% of total)	58%	5	As this indicator measures international exposure, higher percentages are better. See section 6.1	[14]
	Main foreign partners	-	-	US, UK, Germany, India and Belgium	[14]
Knowledge exchange practices					
Intellectual property (RSC17)					
Intellectual property	Country has a body in charge of intellectual property protection	YES	6	See section 6.2	[16]
	Country is member of an regional IP organisation	NO	2	See section 6.2	[16]
	Number of patents applications per million people (global ranking)	115/119	1	See table 3	[10]
	Number of patents applications per million people (African ranking)	19/21	-	Score based on global ranking	[10]
KE support and administration (RSC18)					
Knowledge exchange support and administration	Country has joined a regional initiative for the promotion of STI	NA	NA	No evidence	-
	University-Industry collaboration (score)	3.6/7	3	See section 6.2	[10]
	University-Industry collaboration (ranking)	47/137	6	See table 3.	[10]
	Existence of <u>appropriate</u> institutional policies	YES	6	Common in research-intensive universities.	Interview

COMPONENT	INDICATOR	VALUE	SCORE	DETAILS	SOURCE
	for KE				
	Quality of incentives for research diffusion	Above average	5	See section 5.3, 6.1 and 6.2.	Interview
	Existence of commercial office	YES	6	Common in research-intensive universities.	Interview

Appendix B - Ethiopia stakeholder table

Non-exhaustive list of the MAIN research stakeholders in the country.

	Ethiopia		International	
	Public	Private	Public	Private
Policymakers	<ul style="list-style-type: none"> National Science, Technology and Innovation Council National Planning Commission 		<ul style="list-style-type: none"> African Union Commission 	
Intermediaries	<ul style="list-style-type: none"> Ethiopian Economics Association (EEA) Central Statistical Agency 		<ul style="list-style-type: none"> African Academy of Sciences African Union Development Agency East African Research & Innovation Management Association United Nations Economic Commission for Africa 	
Research funders	<ul style="list-style-type: none"> Ministry of Innovation and Technology Ministry of Science and Higher Education Sectoral Ministries 		<ul style="list-style-type: none"> African Development Bank Ministry of Foreign Affairs of the Netherlands Department for International Development UK International Development Research Centre (Canada) Norwegian Agency for Development Cooperation European Union United Nations 	<ul style="list-style-type: none"> Bill and Melinda Gates Foundation Wellcome Trust William and Flora Hewlett Foundation

			<ul style="list-style-type: none"> World Bank Swedish International Development Cooperation Agency Royal Society of Chemistry 	
Universities	<ul style="list-style-type: none"> 36x public universities 	<ul style="list-style-type: none"> 4x private universities 		
Research institutes & think tanks	<ul style="list-style-type: none"> Ethiopian Centre for Child Research Ethiopian Development Research Institute Ethiopian Public Health Institute Environment and Climate Research Centre Dabat Research Centre The Research Center for Social Sciences and Humanities (RCSSH) Ethiopian Biodiversity Institute Ethiopian Development Research Institute Ethiopian Public Health Institute 	<ul style="list-style-type: none"> Ethiopian Economic Association/Ethiopian Economic Policy Research Institute (EEA/EEPRI) International Centre of Insect Physiology and Ecology Ethiopian Economic Policy Research Institute Organization for Social Science Research in Eastern and Southern Africa (OSSREA) The Horn Economic and Social Policy Institute Institute for Peace and Security Studies 	<ul style="list-style-type: none"> International Growth Centre International Food Policy Research Institute (IFPRI) Royal African Society 	<ul style="list-style-type: none"> IDEAS - Informed Decisions of Actions in Maternal and Newborn Health Africa Institute of Capacity Development African Economic Research Consortium African Technology Policy Studies Network Institute of Security Studies

Appendix C – Interviewees

Name	Organisation
Professor Zerihun Woldu	Addis Ababa University
Dr Ebba Abate	Ethiopian Institute of Public Health
Jemal Beker Abedula	Ministry of Innovation & Technology
Dr Berhe Mekonnen Beyene	World Bank

Appendix D – Peer reviewers

The following table includes a list of individuals who peer reviewed the present report and whose support we gratefully acknowledge.

Name	Organisation
Ajoy Datta	On Think Tanks
Robin Drennan	The University of the Witwatersrand

Appendix E – Key data sources

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