IFS-AAS Project on
Developing an Enabling Scientific Equipment Policy in Africa

Ethiopia National Scientific Equipment Policy Workshop

Ethiopian Academy of Sciences
Addis Ababa, Ethiopia
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Contents

Acronyms

AAS	African Academy of Sciences
ADLI	Agriculture-Development-Led Industrialization
AHRI	Armauer Hansen Research Institute
BSc	Bachelor of Science
CRGE	Climate Resilient Green Economy
DFID	Department for International Development (UK)
EAS	Ethiopian Academy of Sciences
EIAR	Ethiopian Institute of Agricultural Research
EPHI	Ethiopian Public Health Institute
FDRE	Federal Democratic Republic of Ethiopia
FMHACA	Food, Medicine and Health Care Administration and Control Authority
GDP	Gross Domestic Product
GTP	Growth and Transformation Plan
HDI	Human Development Index
HEP	Higher Education Proclamation
HLI	Higher Learning Institutions
IFS	International Foundation for Science
MoFED	Ministry of Finance and Economic Development
MoST	Ministry of Science and Technology
MSc	Master of Science
NMIE	National Metrology Institute of Ethiopia
OEM	Original Equipment Manufacturers
PASDEP	Plan of Accelerated and Sustained Development for Eradication of Poverty
PFSA	Pharmaceuticals Fund and Supply Agency
RARI	Regional Agricultural Research Institutes
SEMS	Scientific Equipment Management System
STI	Science, Technology and Innovation
TCO	Total Cost of Ownership
TeCAT	Technology Capability Accumulation and Transfer
TVET	Technical and Vocational Education and Training
UNDP	United Nations Development Programme
WHO	World Health Organization

Background

In follow-up from the "Conference on Getting and Using Equipment for Scientific Research in Africa", held in Nairobi in May 2012, the International Foundation for Science (IFS) and the African Academy of Sciences (AAS) are continuing their collaboration through the implementation of the MacArthur Foundation-funded project on scientific equipment policy development and change, along with partner organisations in Ethiopia, Ghana and Kenya.

A full description of the background to this year-long project can be read in the *Briefing Document from IFS and AAS: The Procurement of Scientific Equipment is Holding up Research in Africa*[1].

Project Process

Informed by the discussions and outcomes of the Inception Workshop held in Nairobi on 4-5 November 2013, these project activities are following (with tentative timings indicated):

- Country studies with national co-facilitators in Ethiopia, Ghana and Kenya to review the effectiveness of science equipment policies[2] of key organisations in relation to organisational structures and systems; and to map the national and regional research and policy landscape (January – March 2014)
- National Scientific Equipment Policy Workshops in Kenya, Ethiopia (schedule in Appendix 1) and Ghana (one-and-a-half days each, back-to-back, March-April 2014)
- Preparation of briefing and recommendations document (April – June 2014)
- Share project outcomes (by July 2014)

Workshop Participants

Invited participants (Appendix 2) to the workshop include:

- Representatives from partner organisations in Ethiopia
- Representatives of policy-making entities in Ethiopia
- Representatives from interested academies, associations, commissions, institutes, networks and universities in Ethiopia and across Africa

[1] http://ifs.modx.kaigan.se/IFS/Documents/Publications/Briefing%20Documents/IFS%20Briefing%20Document%201-2012.pdf

[2] or practices, procedures and guidelines, where policies do not exist

Opening Session

[Note: On the opening day of the workshop, a Press Release was issued by the Ethiopian Academy of Sciences. See Appendix 3.]

Welcome Remarks from Ato Wondwosen Fisseha, Director General, NMIE

Dear Prof Berhanu Abegaz, Exceutive Director, African Academy of Sciences; Dr Graham Haylor, Director, International Foundation for Sciences; Prof Demissie Habte, President, Ethiopian Academy of Sciences; distinguished invited guests and participants of this workshop,

On behalf of the National Metrology Institute of Ethiopia and myself, I would like to say welcome to all of you to this particular workshop which deals with the national scientific equipment challenges and recommended solutions in Ethiopia.

In follow-up from the Inception Workshop on "Developing an Enabling Scientific Equipment Policy in Africa" held in Nairobi in November 2013, IFS and AAS have requested teams in Ethiopia, Ghana and Kenya to conduct country studies to serve as pilot studies for this particular project. Based on the understanding reached at the Inception Workshop, the National Metrology Institute of Ethiopia and the Ethiopian Academy of Sciences were pleased to jointly organize such an important event which we have realized today.

In Ethiopia, the acquisition, handling and use, maintenance, repair and disposal of scientific equipment are challenges to research institutions, analytical and test laboratories, calibration and metrology laboratories, and laboratories in the agricultural, health and educational sectors. Therefore, the issue of scientific equipment is a national challenge for us.

By understanding the challenge, the government of Ethiopia has addressed issues directly focusing on scientific equipment by incorporating two particular objectives in the National Metrology Institute Establishment Council of Ministers regulation:

- *Build the national capabilities for maintenance of scientific equipment and provide maintenance services*
- *Provide technical, training, consultancy, and information services on scientific equipment with a view to supporting users to carry out their duties effectively*

The Institute has joined the IFS-AAS initiative because it is a direct support of our government strategy to alleviate the problems of handling scientific equipment issues in Ethiopia and we will benefit from the results of the country study and this national workshop.

Finally, I would like to thank IFS, AAS and EAS for the financial, technical and organizational support contributing to the success of this workshop. I wish you all a successful workshop. Thank you.

Remarks from Prof Berhanu Abegaz, Executive Director, AAS

I would like to thank EAS for facilitating a number of things, especially that Prof Mesresha helped to establish a relationship between AAS and EAS. AAS is Pan-African, headquartered in Nairobi, where it owns its own property. Recently, the Nigerian government donated $5 million to our endowment. AAS recognizes excellence through fellows and prizes, and program activities like this project on equipment, which we joined with IFS.

This workshop is not the end. Whatever policy messages we have will be followed up, through capacity-building, and promoting an enabling environment for policy change. The outcomes of the learning in the three countries will be compiled into common messages that will be disseminated through such bodies as the African Union Commission, which is a strategic partner of AAS.

Remarks from Dr Graham Haylor, Director, IFS

IFS's normal business for four decades has been small research grants and capability-building support, individually and as teams, and also helping young scientists to put their research into use. Why is IFS into equipment and policy? Most grants have equipment and this is always a hurdle. We work hand in hand with scientists so they can get the best equipment and can use it.

This is not just an issue in Ethiopia, but continent-wide so we linked with the AUC, and the messages from Ethiopia, Ghana and Kenya will be able to help the whole continent. Science and technology are essential for African development and equipment is crucial to that. From these deliberations, policy messages can reach governments, which can then make policies and take action.

Remarks from Prof Demissie Habte, President, EAS

EAS is honored to host the meeting and we would like to thank the National Metrology Institute and sponsors of the study and the workshop for enabling us to discuss the important issue of scientific equipment policy. This is important as existence of laboratory equipment determines research outputs. This brings out my memories as a young researcher in the lab during which I depended on availability and reliability of equipment. EAS believes that we need good equipment to do productive research. I expect the two-day workshop to provide inputs to enrich the country study. I wish it every success.

Background of the Project

IFS has been committed to addressing the equipment challenge since its establishment in 1970. IFS has already supported over 7,600 early-career scientists in 105 countries throughout Africa, Asia Pacific and Latin America, with research grants and capability-enhancing support, including training on good laboratory practices. More than 80,000 scientists have benefited from using IFS equipment.

Whilst IFS research grants are mainly used for scientific equipment, purchasing

equipment is only the first step. Getting and using equipment in African universities to execute credible research projects for sustainable African development is a key issue. That is why IFS initiated a four-year project funded by the MacArthur Foundation to support “Procurement, Installation, Service, Maintenance and Use of Scientific Equipment” (PRISM).
The PRISM project conducted an audit in 15 African universities to understand the situation concerning equipment procurement and use. It also supported the selection, procurement, transportation, installation, training and use of scientific equipment at these six institutions in Nigeria and Madagascar: Ahmadu Bello University, Zaria (Nigeria); Bayero University, Kano (Nigeria); University of Ibadan (Nigeria); University of Port Harcourt, (Nigeria); Insitut Malagache de Recherché Appliqués (Madagascar); and University of Antananarivo (Madagascar).

At the end of the PRISM Project we held a workshop at the African Academy of Sciences entitled “Getting and Using Equipment for Scientific Research in Africa.” Eighty-six participants from across Africa attended the presentations and also engaged with each other on effectively providing scientific equipment. A Briefing Document entitled “Taking Equipment Seriously” was developed and shared with other research institutions and funding organizations.

There were nine key learnings:

- There is no ‘one size fits all’ in equipment provision.
- Participatory planning of procurement, use and maintenance is highly beneficial.
- Developing a strategy for equipment procurement is vital.
- It is important to use proper clearing and forwarding agents and lobby for simplified procedures for importing and forwarding scientific equipment.
- Face-to-face meetings are best to understand long-term needs and equipment upgrade paths.
- Develop “standard procedures” for efficient use, since burdensome paperwork and regulation in institutions and universities can limit the use of installed equipment.
- Centralization enables pooling of resources, efficient management, adequate security, infrastructure and utilities.
- Negotiate collaboration around expensive equipment within a country or region.
- Discourage “personalization” of equipment (the opposite of collaboration).

The consensus was: Materials and equipment for scientific study should be facilitated to move quickly through national boundaries, like those for health equipment and military equipment do, i.e., precedents already exist.

To try to influence scientific equipment policy development we launched this follow-up project on “Developing an Enabling Scientific Equipment Policy in Africa.” An Inception Workshop took place on 6-7 November 2013 on the AAS campus in Nairobi.

IFS and AAS began to work with partners in Ethiopia, Ghana and Kenya to carry out

Country Studies leading to understandings of:

- Institutional, national and regional equipment policies
- Case studies of institutions
- Relevant ministries with which to engage in discussions about scientific equipment policy
- Regional equipment facilities and services
- The role of the private sector

The Country Study has two key objectives:

- To review the effectiveness of science equipment policies of key organizations in relation to organizational structures in Ethiopia
- To map the national and regional research and policy landscape in Ethiopia

And we look forward to hearing about it this morning.

Comments and Questions

- When we say scientific equipment, is it for research only? What is the scope?

- Is there a standard list of scientific equipment for particular disciplines? *There are no basic lists or inventories and usually scientists are not involved in procurement*. *In Axum University there is a basic list for particular fields.*

- The Ministry of Education started a procurement process for new universities.

- Does the issue start with procurement? Or is there a state before, e.g., manufacturing?

- Sometimes it is a not a problem of the equipment but rather commissioning, installing, use, and human capacity.

- From NMIE, we welcome inputs of all participants into the study as scientific equipment should not be an impeding factor. NMIE has 24 years of experience of these issues. NMIE is mandated to support this in Ethiopia.

Presentation of the Country Study

The presentation was made in three parts by Ato Abebayehu Mamo, Ato Abebe Mekuriaw, and Dr Frehiwot Woldehanna.

Intention of IFS-AAS Country Study

Given enabling policies, scientific equipment and human resources, scientific research results in patents, innovations and publications. Scientific equipment are used to, for example:

- Measure physical quantities
- Control events
- Monitor the status
- Detect the unknown
- Separate organic compounds
- Inspect compliance against standards

Problems exist throughout the equipment life-cycle of acquisition, installation, use, maintenance and disposal.

What would happen if we fail to manage scientific equipment?

- Cumulative percentage of unused equipment increases; research could be suspended or abandoned
- By the same proportion, the investment on research and development vanishes
- Results coming out from labs become uncertain
- Public confidence in scientific outputs diminishes
- Economic growth slows down
- Dissatisfaction with scientific services increases

Because scientific equipment problems are holding up scientific research endeavors in Africa, this project on “Developing an Enabling Scientific Equipment Policy in Africa” was initiated by IFS and AAS. An Inception Workshop was held in Nairobi, Kenya. It expanded the range to three countries to understand how scientific equipment policy can enhance the scientific endeavor across Africa.

The specific objectives of the Country Study were to:

- Review the effectiveness of science equipment polices of key organizations in relation to organizational structure and systems
- Map the national and regional research and policy landscape

Country Context in Brief

Ethiopia is a country of 84 million people, over 80% of whom live in rural areas. Agriculture contributes 45% to GDP. The Government has adopted its ADLI economic strategy. The poverty percentage declined to 29.6 from 38.7 in 2005, and six out of eight MDGs are on track. The Human Development Index (HDI) grew to 0.396 in 2013 (the third top mover).

Methodology of the Study

The study’s methods were documentary research and structured interviews with key informants or resource persons. The key points of the structured interviews were:

- Research priorities and outputs
- Institution wide-policies, guidelines, and procedures on scientific

equipment management including procurement, use and maintenance
- Methods of acquisition (e.g., procurement, donation)
- Acquisition of equipment including reagents, supplies and accessories
- Selection of appropriate equipment
- Installation and acceptance testing
- Use, maintenance and calibration
- Disposal and equipment replacement
- Custom and research equipment
- Human resources development

An Overview of Research in Ethiopia

The history of research in Ethiopia is mainly associated with establishment of higher learning institutions. Research is institutionalized in the agriculture and health sectors, in agriculture through the EIAR system (federal institute with research centers), and the Regional Agricultural Research Institutes; and in health through the Ethiopian Institute of Public Health and the AHRI.

In industry, there are recently established institutes in the government priority sectors of leather; textiles and garments; metals; food, beverage and pharmaceuticals; and chemical and construction. In universities, teaching staff are engaged in research activities and specialized research institutes have been or will be established.

Research priority areas are:

- Adaptation of technologies to improve agricultural and industrial production and productivity
- Agricultural biotechnology
- Natural resource development and conservation
- Environmental protection
- Development and conservation of biodiversity
- Renewable energy
- Climate change, mitigation and adaptation
- Human and animal health
- Technologies for SMEs

Constraints and challenges in research include:

- Inadequate attention for technology copying and adaptation
- Inadequate research infrastructure
- Inadequate financial support for infrastructure development and research activities
- Low level of research in the industrial sector
- Shortage of qualified research personnel
- Absence of qualified personnel to manage scientific equipment
- Absence of results-based incentive systems for researchers
- Absence of prioritization and coordination of research activities at national level

- Weak linkage among universities, research institutes and industries

The National STI (Science, Technology and Innovation) Policy of 2012 aims to promote research that is geared towards technology learning and adaptation. It considers research as one of the 11 policy issues addressed, and identifies having an effective national research system as being of significant strategic importance. The STI Policy notes that there is a gap between the research activities and focuses on higher education and research institutions and the national development need. It stresses that the national research system should be strengthened and oriented to focus on the national technological demands for searching for, learning about, adapting and utilizing effective foreign technologies.

According to the STI Policy, research is needed to address the resolution of major social and economic problems, contribute to the achievement of national development objectives, and meet technology demand. The major emphasis is on problem solving, technology copying and adaptation.

To implement the STI Policy Strategy, the Government recently adopted detailed guidelines with specific strategies followed by specific goals and mechanisms. The major goals, among others, are:

- Allocate at least 1% of annual GDP to strengthen national research infrastructure
- Make available adequate qualified researchers for research institutes
- Establish a national research council to guide and coordinate research at national level
- Encourage and support joint applied research activities by research institutes, universities and industry
- Support medium and large enterprises in priority sectors to establish their own research units that work on technology adaptation

To foster an enabling environment for research, there has been:

- Issuance of the new STI Policy with the objective of promoting research
- Establishment of a National STI Council, under the chairmanship of the Deputy Prime Minister, to guide implementation of the policy
- Adoption of an elaborated strategy with specific goals to implement the policy
- Adoption of guidelines for university-industry linkage
- Establishment of a National Science and Technology Research Council to guide, prioritize and oversee research at national level
- Due recognition of the role of research as an enabling factor for national development by policy-makers
- Expansion of universities covering almost all parts of the country (33 universities), creating potential research and community service centers

In conclusion, research in many sectors is in its infant stage and needs to be supported in terms of qualified manpower, research equipment and financial resources. The measures being taken by the government in terms of policy,

strategy and institutional capacity-building are likely to strengthen research and its role in development. The increase in the number of research actors and diversification and deepening of research require more sophisticated scientific equipment and support services throughout the equipment life-cycle. This makes the agenda of this workshop relevant and timely.

Preliminary Findings

In terms of the scope of the Country Study, there was a review of existing information on:

- Availability of scientific equipment in the country including their status
- Management procedures and available budget, manpower and maintenance for scientific equipment in selected target institutions
- Policy and guidelines in relation to scientific equipment acquisition, installation, operation, maintenance and disposal (if any)
- Recommendations on policy issues

The visited institutions were:

- Addis Ababa University
- Arbaminch University
- Bahir Dar University
- Mekele University
- Unity University
- Ethiopian Public Health Institute
- Ethiopian Institute of Agricultural Research

The reviewed information and results are:

- Research status and output: Much research is undertaken by staff but experimental research is not as much as other types of research (e.g., desktop and statistical). This is partly due to limitation of access to equipment and unavailability of appropriate equipment.

- Availability of acquisition policies and guidelines: Higher and research institutions do not have policies and guidelines for acquisition of scientific equipment. As a result, there is no procurement needs assessment at institution level but individuals assume the responsibility of technology and supplier selection which may not be up to the desired standard.

- Procurement rules and regulations: The same rules and regulations for ordinary commodities govern the procurement and handling of expensive scientific equipment. Chemical supplies with sensitive storage times are not prioritized to reach the researcher and in some cases use of such chemicals may lead to distorted results.

- Procurement planning: Different colleges or universities or even different departments of the same one spend a lot of money on similar equipment

while the budget could have been wisely used on other facilities or activities.

- Equipment management system: There is little attention to end-to-end management of expensive scientific equipment in both academic and research institutions. There is not even an organizational structure to address the issue of specification, operation, testing, calibration and maintenance services. No maintenance budget is considered.

- Calibration, testing, maintenance and disposal: No attention is given to calibration, testing, maintenance and disposal of the equipment. Thus, there is no guarantee of accuracy of measurement and limited maintenance is performed.

- Technical personnel availability: There is much scientific equipment but most of them are defective (some just the day they were received) with some due to minor problems such as blown fuses, disconnected wires, and mis-configuration. The major problem reported by almost all the institutions is shortage or unavailability of technical personnel that matches the complexity and diversity of the equipment. The available technical personnel are at best middle level professionals with limited experience in handling of such equipment. In fact, there is no academic program in the country to fill the manpower gap.

- Technical capacity of suppliers: Most suppliers do not have the technical capacity to provide technical service. They act as representatives or agents of foreign suppliers for a specific bid and do not give attention to after-sales support.

- Equipment ownership problems: Most scientific equipment have been purchased through individual project funds and are treated as personal assets by some researchers throughout their lifetime although, in principle, all such equipment is the property of the institutions.

Proposed Actions

- Creation of a national database of scientific equipment with sufficient detail, including a web-based system to enable any researcher in the country, and beyond, to get availability information

- Development of scientific equipment policy and enforcement as soon as possible to address every aspect relevant to the end-to-end service life of equipment

- Facilitation of development and launching of academic programs at both undergraduate and postgraduate levels in the areas of scientific equipment management including specification, testing, calibration, maintenance and design

- Strengthen national scientific equipment management structure which should include an institutional equipment center at each higher education and research

institution as well as a stronger full-fledged national equipment center with independent organizational structure and career development opportunities

- A national equipment center would have major activities in equipment standardization, calibration, technology transfer and knowledge management (currently, National Metrology Institute plays a role)

- There could be institutional equipment management centers with major activities in specification, operational training, on-site testing and calibration, and maintenance and repair

Desired Policy Features

- Any institution with scientific equipment should have the minimum number of qualified technical personnel with expertise in instrumentation engineering (national level), along with senior instrumentation engineers and instrumentation technologists (institutional level)

- Competence certification scheme for professionals and companies dealing with supply, installation, testing, calibration and maintenance

- Company requirement for the minimum number of qualified technical personnel (at least one instrumentation engineer or electrical engineer with industry training and certification)

- Any institution with scientific equipment should be able to manage its own equipment and solve at least 75% of maintenance problems. The remaining 25% of problems can be outsourced and capacity-building activities must be performed.

- There should be a reasonable annual maintenance budget as part of the operational budget for academic and research institutions.

- Procurement of scientific equipment should be done from the minimum possible number of manufacturers to keep equipment brands to a minimum.

- Procurement of scientific equipment should be accompanied by reliable supplier training and maintenance (after-sales) support.

- There should be scientific equipment donation policy to avoid obsolete technology and not serve as a disposal option.

- There is much scientific equipment in many academic and research institutions acquired through project funding, government procurement, or donation.

- There is little technical manpower to properly manage the equipment and expected equipment utilization in regular and research activities is highly impaired.

- A favorable policy and working environment should be created to improve the effectiveness of the equipment.

- Academic and research institutions should have equipment management centers with sufficient budget and manpower.

- A national equipment center, similar to the former National Scientific Equipment Center, with high-level support and expertise should be reactivated.

- Facilitate launching of tertiary-level programs to produce instrumentation engineers and technologists who can fill the current technical manpower gap.

- Capacity-building measures must be taken and competence certification schemes must be established for professionals and business companies involved in supply, installation, testing, calibration and maintenance activities.

Discussion of the Country Study

On the Country Study

- Is the sample of institutions for the study representative? Is the study a little skewed toward universities at the expense of other sectors? How did you select where to visit?

- Have adequate quantitative data been collected that can support or be an input to policy formulation? Is there an appropriate balance between qualitative information and quantified data?

- Have design, prototyping and manufacturing been included in the study?

On Procurement

- Procurement problems begin with specifications. If there is a gap then cheaper equipment can be included in the comparison and will be selected on the basis of least cost. A scientist should provide the information first, then a technical team should come up with a detailed specification.

- Formerly the Ministry procured for universities, but this missed the needs assessment.

- The Procurement Directive of Government does not have a least-price policy. This is done as a final comparison process once the full assessment has been made and equipment that is suited to the purpose selected.

- As far as equipment from different companies is concerned, is this from procurement policy needs? The diversity of equipment originates from 1) specifications coming from researchers and these are from different backgrounds, including overseas where they may be familiar with different

equipment; 2) in the government procurement process, you can not specify the brand and supplier; and 3) there are no guidelines for donations of equipment.

On Standardization

- Needs assessment should emanate from a certain standard. We have to see how other countries operate.

- Standardization of equipment is good in maintenance terms but against free market principles, how to manage this in a policy?

- Universities are facing challenges. We do not have standards for much equipment in Ethiopia. The government does not allow specification of the brand and non-brand specifications can be quite generalized and may allow poor equipment to be included in quotes and the cheapest may be selected, even though inappropriate.

- There is an issue with the practice of writing specifications (who should write) in institutions and the standardization of equipment.

On Quality of Equipment

- Manufacturers design in obsolescence, and this then causes categories of quality in relation to price and cost effectiveness.

On Equipment Life-Cycle

- What are overlapping issues in the various stages of the equipment life-cycle?

- Needs assessment and specification comes before procurement in the equipment life-cycle. In the team's understanding assessment ahead of procuring is essential and is a part of acquisition.

- The equipment life-cycle could be updated and a pro-forma created.

On Equipment Availability

- What about the issue of unavailability of equipment and limitation of access by some researchers?

- Access can be limited by lock and key by researcher seniority.

- Equipment as personal property is a big issue. Some professors lock up their equipment in case it is misused.

- Many Ethiopians shy away from breaking up and testing equipment. Children are nurtured in a non-technical environment.

- Records of scientific equipment need to be established and not as a one-off but regularly updated. The TOR was to understand the context of scientific equipment for the purposes of policy development and not to generate an inventory of equipment.

On Consumables

- What about reagents? So far we have only discussed equipment. Continuity of service is vital.

- There is an issue with provision and maintenance of supplies (reagents and materials) to run equipment properly.

- How do we safeguard the users of radioactive agents? Should this be in a policy?

On Practice in Other Sectors

- Biomedical, ICT, engineering, and scientific equipment are all relevant sectors. Is there a model for national equipment recommendations?

- What models or benchmarks are used in designing the institutional arrangements for scientific equipment?

- Is it possible to consider medical equipment management practices from the health service sector and apply them to other scientific equipment?

- The Asset Management Directive of the Ministry of Finance in medical equipment also specifies the lifetime. So this can be helpful as a practice.

- There is a medical equipment policy. Donations are unaffected by government policies and that is how the health sector avoids difficult bureaucracy. Essential lists of equipment are published for each hospital, which is a good practice we can take for the science research sector. There is a technical services sector in every hospital; this could also be a good practice.

On Policy Development

- Have all strategies in the country been reviewed before formulating a new one, to ensure your proposals are not already answered?

- Scientist's begin their passion for science early in life. Are we considering that in the policy for science?

- Are meetings or discussions to address scientific equipment issues conducted in the country and how frequent?

- It is good to include design, prototyping and manufacture of scientific equipment under the term acquisition in any policy proposal as this fits with national policy on moving from an agriculture-based economy to an industrial economy.

- Discussion of equipment is rare. The first international conference was the Ethiopia Science and Technology Commission to design national policy and the National Science Equipment Centre (NSEC) was established. There was also a national symposium with UNDP funds to establish the NSEC and this was supported by private and government sectors. We did a study on equipment use. Among other things, we found that Australian and Canadian equipment were destroyed when used in a 240-V environment, and that about 10% of equipment was never unpacked. So we knew we needed a NSEC.

Further Enrichment to the Country Study

Equipment Life-Cycle

A brainstorming session was facilitated to generate key words associated with five stages of the scientific equipment life-cycle: acquisition, installation, use, maintenance and disposal. These words and phrases could be used to generate messages that policy-makers need to hear to become convinced of the importance of paying attention to issues of scientific equipment.

Acquisition

Planning
Budgeting
Technology and needs assessment
Selection
Procurement
Logistics
Standardization
Specification
Commissioning
Documentation such as manuals, operating procedures
Warranties
Quality
Spare parts
After-sales provisions and service
Training
Importing
Local production
Refurbishment
Renting and leasing
After-purchase checking
Calibration and testing

Installation

Site preparation and layout
Electromechanical work
Commissioning
Calibration
Acceptance testing
Budget identification and allocation
Procedure development
Acceptance testing procedure
Identification of missing parts
Consumables
Safety steps and protocols

Use
User training
Calibration
Lab procedures
Verification and validation
Consumables
Budget identification and allocation
Recruitment of human resources
Procedures development and sharing
Training
Usage logs
Preventive maintenance protocols and schedules

Maintenance

Preventive maintenance
Servicing
Upgrading
Training and workshop organization
Maintenance records
Inventory of equipment
Procedures development
Budget identification and allocation
Spare parts management
Repair
Upgrading software

Disposal

Cost analysis
Planning for disposal
Refurbishing
Safety issues
Cannibalization and spare parts
Procedures development
Budget identification and allocation

Replacement
Life-cycle planning in relation to disposal
Disposal for educational use

Terms of Reference

Three small groups were formed to discuss the last three items in the TOR for the Country Study and thus to add to its findings. These are 1) formal and informal links and channels, 2) potential of the media to influence policy, and 3) national level of awareness of regional policy influences.

Formal and Informal Links and Channels

- National Science, Technology and Innovation Council headed by the Deputy Prime Minister and comprising 14 ministries
- Association of Public Universities
- House of People's Representatives and their standing committees
- Line ministries: e.g., health, science and technology, finance and economic development
- Ethiopia Academy of Sciences
- Ministry of Industry (industrial design)
- International organizations such as the WHO
- Ministry of Finance and its agencies working on procurement and disposal of property
- Forum of public university presidents
- Professional societies
- No individual champions have been identifies so far

Research in Ethiopia is hampered by this issue and we are happy that IFS and AAS raised it. We raised this with the Minister of Education 3-4 years ago. He agreed to form a committee to oversee import of equipment and to encourage collaboration among universities. Still universities and institutes procure equipment and most are "dead on arrival", lacking elements, or damaged. Not many government officials are aware of this. We need guidelines and national directives that everyone follows for identifying maintenance and training needs. There could be a more detailed study commissioned and studies of best practice also from other sectors, e.g., airlines.

We recommend awareness-raising (a conference), detailed equipment study, and the establishment of units in each university (responsible for management of scientific equipment, recruiting technicians and engineers to specify performance testing, maintenance and even design).

This was a timely workshop as it is a huge problem that is felt everywhere. The extent of the problem is not clear to policy-makers so we may need to have a conference in which this country study and other pilot studies could be presented and use this as a platform for the policy. NMIE and EAS should come together to develop a conference on this issue that IFS and AAS have catalysed.

The National Science Technology Strategy adopted by the National Science Technology Council is already out. If there is no specific statement we should make one and prepare a directive for a national audience.

Potential of the Media to Influence Policy

Private and public electronic, print and social media can reach various policy-makers and shapers through different channels. It may be difficult to share this issue with the media but we need to share about the equipment life-cycle and needs in an exciting way. If there was a conference there could be a media day.

There are public relations departments in each university. Using existing options and the production of a documentary on the issue are ideas to consider. Additional points would include use of Public Relations Officers in awareness creation and experience sharing with the media to give them a good picture of the expected change.

EAS can research on the status of scientific equipment and could produce documents. The use of established networks including scientific journals and websites was suggested.

Other ideas are:

- Sponsored programs
- Using existing TV programs
- Documentary productions
- Panel discussions on TV
- Using public relations departments in organizations
- Working with Association of Science Journalists
- Media day
- Presentation to government officials in economic and social impact terms (e.g., the lab of Great Ethiopian Renaissance Dam)

National Level of Awareness of Regional Policy Influences

Modalities for creating awareness include study tours, leaflets, meetings and periodicals, and recurrent training.

Policy influencers are parliamentarians who have access to regional, district and local level influencers. Ministerial organisations and professional societies (annual conferences and meetings) could create collaborative programs.

Regional issues include capability-building across borders through AU activities; and standardisation across the continent, e.g., of power supply. An integrated Africa is ambitious but perhaps things are progressing, reaching decisive government organisations. A continental awareness campaign could be undertaken through the AU.

Next Steps

Prof Berhanu Abegaz highlighted some of the places in which next steps might be taken:

- Present the policy issues to top decision-makers at national and especially regional (African) levels, through champions, experts, the Pan-African Parliament, and ministerial meetings.
- Linking with the Pan-African University initiative
- Through AMCOST with its bureau of eight countries. The expert group meeting before AMCOST is important and our colleagues in the AUC set the agenda. (AMCOST will cease and science and technology will join with higher education.)
- The East African Community has a science and technology office and AAS has links with four of the six African regional groupings.

Dr Graham Haylor spoke about a meeting that had taken place in the African Union Commission among IFS, AAS and the contact persons there with whom the project is liaising with a view to further dissemination of the project's outcomes. The short report of that meeting is in Appendix 4.

Closing Session

These were the closing remarks of the workshop:

Prof Berhanu Abegaz: *The workshop went on as scheduled. We have learnt a lot. I thank all who participated, especially the parliamentarians and the organizers for their hospitality.*

Dr Graham Haylor: *IFS has an interest in this subject as it gives grants to young researchers and part of the fund is for scientific equipment. However, the scientists are facing problems and hence IFS wants to address these issues. It is always great to work with AAS. I thank participants for your enthusiasm, especially the members of parliament. The workshop went on the right track, and I thank, on behalf of IFS, EAS, specifically Prof Masresha and his team, the organizers, NMIE, the study team, the facilitator Bill Savage, and all participants.*

Dr Frehiwot Woldehanna: *I am glad that the opportunity was created to discuss this important issue. On behalf of the study team, I thank EAS, AAS and IFS. There is a lot to do and I hope that the support will continue.*

Eng Abebayehu Mamo: *On behalf of NMIE, I thank EAS, AAS, IFS and the participants. NMIE will continue working with all concerned as the issue of scientific equipment is our job and it is our responsibility to solve the equipment problem. NMIE will knock on the doors of all stakeholders and supporters to achieve this goal.*

Prof Masresha Fetene: *The members of the Academy are veteran academics and are highly passionate about the issue of scientific equipment. EAS is involved in the*

National Research Council and can present this issue, and the EAS can also help in studying on the subject and publicizing the findings. The workshop has created the opportunity to discuss the issue. EAS will continue working with AAS, IFS, Government ministries and agencies. I thank all the participants and declare the workshop closed.

Workshop Evaluation

At the end of the workshop, participants were asked to spend a few minutes writing their thoughts on what worked well and what could have been done differently. Their responses are in Appendix 5.

Appendix 1 Schedule

3 April 2014		
Session		**Speakers / Facilitators / Rapporteurs**
0900-0945	Welcome remarks and introductions	Ato Wondwosen Fisseha, Director General, NMIE Prof Berhanu Abegaz, Executive Director, AAS Dr Graham Haylor, Director, IFS Prof Demissie Habte, EAS Facilitator: Ato Wondwosen Fisseha
0945-1030	Background of the project	Dr Graham Haylor
1030-1100	Break	
1100-1230	Presentation of the Country Study	Ato Abebayehu Mamo, NMIE Ato Abebe Mekuriaw, EAS Dr Frehiwot Woldehanna, AAiT, AAU Facilitator: Mr William Savage Rapporteurs: Ato Gebru Ayehubizu and Ato Nathnael Wassie
1230-1400	Lunch	
1400-1530	Discussion of the Country Study	Facilitator: Mr William Savage
1530-1600	Break	
1600-1700	Discussions on further enrichment to the Country Study	Facilitator: Mr William Savage
1900	Workshop dinner	

4 April 2014		
Session		**Facilitator / Rapporteurs**
0900-1030	Discussion on next steps with a focus on engaging with national and regional policy-makers and -influencers	Facilitator: Mr William Savage Rapporteurs: Ato Gebru Ayehubizu and Ato Nathnael Wassie
1030-1100	Break	
1100-1230	Workshop evaluation and closing remarks	Facilitator: Mr William Savage Rapporteurs: Ato Gebru Ayehubizu and Ato Nathnael Wassie
1230-1400	Lunch	

Appendix 2 Workshop Participants

1. Abebayehu Mamo	National Metrology Institute
2. Abebe Mekuriaw	Ethiopian Academy of Sciences
3. Aminat Endris	House of Peoples Representatives/Parliament
4. Anberbir Getaneh	Ethiopian Intellectual Property Office
5. Araya Hymete	Addis Ababa University
6. Berhanu Abegaz	African Academy of Sciences
7. Berhanu Gizaw	Ethiopian Electrical Engineers Society
8. Demeke Bitew	National Metrology Institute
9. Demissie Habte	Ethiopian Academy of Sciences
10. Esayas G Yohannes	Addis Ababa University
11. Firaol Alemu	Ministry of Health
12. Fantahun W Senbet	Arba Minch University
13. Frehiwot W Hanna	Addis Ababa Institute of Technology, AAU
14. Gebeyaw Alemu	House of Peoples Representatives/Parliament
15. Gebru Ayehubzu	Ethiopian Biomed & Lab Equipment Engineering Association
16. Graham Haylor	International Foundation for Science
17. Hailu Wudineh	Ethiopian Academy of Sciences
18. Masresha Fetene	Ethiopian Academy of Sciences
19. Mesfin Redi	Chemistry Department, Addis Ababa University
20. Mesfin Shiferaw	Afri-Zemenat Business Group PLC
21. Mihretu G Christos	National Metrology Institute
22. Mulugeta Mideksa	Ethiopian Biomed & Lab Equipment Engineering Association
23. Nathnael Wassie	Ethiopian Academy of Sciences
24. Nunyiat Wasyihun	Ethiopian News Agency
25. Sakata Abera	Ethiopian Public Health Institute
26. Tadesse Dejenie	Mekelle University
27. Tamiru Taye	Ethiopian Intellectual Property Office
28. Tesfaye Mekuria	Ethiopian Press Agency
29. Tezazu Bireda	Addis Ababa Institute of Technology, AAU
30. Wendimagegn Mammo	Addis Ababa University
31. William Savage	International Foundation for Science
32. Wondwossen Fisseha	National Metrology Institute
33. Yitatek Kelemu	Ethiopian Academy of Sciences
34. Yohannes Taye	Ethiopian Academy of Sciences
35. Zelalem Dagne	Ministry of Science & Technology
36. Zerihun Mekasha	Ministry of Agriculture

Appendix 3 Press Release

Ethiopia's Country Report on Scientific Equipment Policy Need

3 April 2014, Addis Ababa
Ethiopian Academy of Sciences, No 003

A national workshop begins today at the Headquarters of the Ethiopian Academy of Sciences to discuss the draft Ethiopian country study report on the development of scientific equipment policy in Africa. The study was initiated following the request by the International Foundation for Science (IFS) and the African Academy of Sciences to undertake pilot country studies in Africa subsequent to the preliminary discussions on the issue in Nairobi, Kenya in November 2013. Teams were set up in Ethiopia, Ghana and Kenya to carry out the IFS-AAS "Developing an Enabling Scientific Equipment Policy in Africa" project in their respective countries.

After reviewing the efficacy of the science and equipment policies of key organizations, in relation to organizational structure and the state of systems, the study explored the national and regional research and policy environment in terms of equipment procurement, use and disposal which will be discussed at today's workshop.

Data for the country study was gathered from the Ministry of Science and Technology, Addis Ababa University, Bahir Dar University, Arba Minch University, Mekelle University, and Unity University. Ethiopian Institute of Agricultural Research and the Ethiopian Public Health Institute were also data sources for the study.

Some of the findings and suggestions of the study include:

- It has been observed that capacities need to be built both at institutional and national levels to ensure identification of appropriate equipment, acquisition, proper operation, maintenance and timely disposal of obsolete and non-functional equipment. The study suggests that universities and research institutions need to develop a critical mass of professional/technical staff that is able to assist researchers through the life cycle of equipment.

- The team found out that there is a near absence of local capacity for supplying major scientific equipment and for providing operational support while in use. It is suggested that local firms should be enabled to fill the gap.

- Adoption of national policy on scientific equipment is required to address the outstanding problems which have been affecting research activities and services of universities and research institutions for several years.

Forty participants, representing various ministries, universities and research institutions, IFS and AAS are attending the event. The Workshop is expected to provide feedback and inputs to the preliminary report. The study will be finalized taking into consideration the outputs of the Workshop and is envisaged to contribute to the continent wide effort to create an enabling policy for scientific equipment as one of the major inputs to enhance research and development outputs.

The Ethiopian Academy of Sciences is established with a vision to realize the development of scientific culture and scholarship in Ethiopia, the advancement of the sciences and the culture of scientific research, to enhance networks among the scientific community, and to advise the Government of Ethiopia on issues pertaining to the quality and relevance of science. It was recognized by an Act of Parliament in March 2013 (Proclamation 783/2013).

For more information
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Addis Ababa, Ethiopia

Appendix 4 Short Report on IFS meeting at AUC HRSTD

On 1st April, 2014 Dr Mahama Ouedraogo, the Head of the Science and Technology Division of the African Union Commission and Mr Hambani Masheleni, Senior Policy Officer, Human Resources, Science and Technology Department, met with Dr Graham Haylor, the Director of the International Foundation for Science (IFS) accompanied by Professor Berhanu Abergaz, the African Academy of Sciences (AAS) Director, at the African Union Commission in Addis Ababa, Ethiopia. There was a brief follow-up meeting with Dr Abdul Hakim Elwaer, the Director of the Human Resources, Science and Technology Department.

The meeting discussed the IFS-AAS Project on 'Developing an Enabling Scientific Equipment Policy in Africa'. There was an update of: the project progress and a discussion of its objectives, and the pilot Country Studies under way to review the effectiveness of science equipment policies of key organizations in relation to organizational structures and systems in each country, and to map the national and regional and research and policy landscape, and the National Workshops being conducted in Ethiopia, Ghana and Kenya for this.

Dr Mahama Ouedraogo highlighted the relevance of this issue to Africa and the AUC and he suggested that the role for the AU was in policy aspects and the scalability of operation. It was agreed that developing an enabling Scientific Equipment Policy in Africa was an important subject to boost and support science across Africa and that it was very appropriate to collaborate with the AUC to highlight this issue, which Dr. Mahama Ouedraogo said "was needed yesterday not tomorrow". Mahama Ouedraogo suggested that the key messages emerging from the project might justifiably receive follow-up as a Pan-African Parlimentary Agenda Item to promote an Enabling Scientific Equipment Policy in Africa in the constituencies of the Member States, and that it may be appropriate to take this to the Ministerial level in due course.

The meeting discussed the IFS granting and capability-building programme, highlighting that over 7,500 grants have been awarded, that in 1974 IFS Grant no. 1 went to Côte d'Ivoire, and that by 1999 IFS Grantee no. 3,000 was in Morocco. That 49 countries in Sub-Saharan Africa are eligible for IFS support today and that as well as individual grants, IFS has been piloting a collaborative research approach using facilitated social networking which has been very successful. In the first pilot 500 aspirants had been filtered down to 40 multi-country research teams of which 25 had applied for grants and after rigorous review 10 teams involving 38 scientists had been successful and were conducting research over 1-3 years. The second collaborative research call had just been launched involving Benin, Burkina Faso, Côte d'Ivoire, Ghana, Nigeria, South Africa, Tanzania and Uganda, with a focus on research into biodiversity.

The IFS approach to collaborative research which focuses on excellent individual scientists was of interest to HRSTD which has been implementing research collaborations between institutes. It was agreed that HRSTD and IFS would seek ways to join hands on the collaborative research approach, with a particular relevance to the distributed campuses of the Pan-African University.

It was agreed that Mr Hambani Masheleni would be the AUC contact person for both initiatives.

Appendix 5 Evaluation Responses

[Note: Responses with the same number are from the same person. Dashes (--) signify that the person did not have a comment.]

What worked well?

1. All the presentations were informative so that I gained a lot from this meeting; the participants drawn from different firms were well experienced and I think they have passed their experience to the team working in launching scientific equipment policy in Ethiopia; the moderator was good to stimulate the participants to share their experience, opening the floor for everybody to comment and make suggestions on the issues.
2. Bringing the issue of scientific equipment on board; invited delegates from concerned authorities; keynote opening remarks were good and eye-opening; group discussions were good; presentations of the country studies were also nicely done.
3. Schedule; program; logistics; preparation; meals; methodology; facilitation; speech.
4. I was not able to attend the first part of this workshop and as a result I missed an important session. The remaining sessions were well organized and participants were passionate about the issues under discussion; the most important achievement to me is the commitment on the parts of participants to take the matter up at a national level and participate in all future endeavors.
5. Moderation; selection of participants; meeting venue selection; food; timely topic; participation of members.
6. There was enough time for participation; the program and its facilitation worked well.
7. Adequate scheduling for presentation and discussion; conference room was good; meals and refreshments were served well; good facilitation of the workshop where participants had a chance to air what they feel and want to say; speakers are selected well and know the area; the issue is relevant.
8. The facilitation all are good; the country study presented well the key problems of the scientific equipment management in Ethiopia; all issues must be included in the policy document mentioned and noted (the scientific equipment life cycle); the university researchers are aware of this workshop and the problem of scientific equipment; the IFS-AAS are fully worked in this workshop well and nice; the workshop identified well the users, champions, and influencers of policy.
9. Better done was that the proclamation of scientific equipment to the public on how to use, laws and regulations for equipment; the formal and informal idea transfer among national institutions (universities and research organizations) on how to use these equipment and making the government the idea of scientific equipment at large.
10. The workshop was done well. Before now I did not understand about scientific equipment that are facing the problem in different institutions; I got basic knowledge and relevant information; this workshop indicated to policymakers to prepare and make policy; finally the workshop was interesting; I like to say thank you for the program coordinators and presenters and to EAS and IFS.
11. The program and schedule of the workshop were good; the facilitator did a wonderful job jumping in to guide and lead the discussions; the group discussion brought out interesting ideas; the workshop created an interest and awareness of a national problem.
12. Program; meals; facilitation; methods; speeches.
13. Good method followed; arrangement is good in a calm place; car arrangement done well – otherwise it would have been unreachable; meals and breaks service were comfortable; participatory and inviting discussions; good care and follow-up of guests and participants; participants selected from the right areas though small in number
14. Organization and schedule; facilitation as per the schedule; presentations; methods of conducting the workshop; meals and refreshments; logistics.
15. Schedule; logistics; presentations; facilitation; speakers; meals; moderation.

16. Within a short time we can discuss more; the flow of the idea or the method of moderating the meeting is interesting and exactly time-based; the issue and combination of participants are good; I am interested in the method of moderating the flow of ideas and use of time; all is good; I have learnt from the experience and ideas; with few selected people and short time, getting a lot of information.
17. Participatory nature; presentations were not monotonous; cooperative and collaborative nature of the presentations; the atmosphere under which the discussions took place was great; team work under the three topics were welcome; after the policy document is produced how are we going to appreciate it?

What could have been done differently?

1. It would have been good to organize the meeting in a convenient place for everybody. The conference place is far from the center; it would have been nice to distribute hard materials to participants for better understanding.
2. The specific issues might have been clearly identified, which might be later prepared as a draft policy.
3. Audience – high level management group is scarce; location – although popularization of EAS headquarters is good, the location being off-center, I think many more participants could have come had it been at the center.
4. I don't think many are aware of the gravity of the situation we are in concerning scientific equipment in this country. The conference could have discussed these issues at length.
5. Country study could have been a little more detailed; experience of other countries in a similar situation could have been presented to compare ourselves with.
6. –
7. Venue not accessible easily, far from the center of the city; presentations could have been distributed beforehand; for serious discussions, for the future, hold the workshop out of Addis.
8. All stakeholders are not present.
9. Still the situation was just on the making of laws and regulations, but I don't know when and where the situation will be finalized in a short period of time.
10. –
11. The country study should have been ready and distributed; the output of the workshop was not clear; ideas suggested in the group were not discussed sufficiently; not all stakeholders were represented – the call for the workshop should have been more widespread.
12. Scheduling and organization of the workshop and invitations; logistics and transport arrangements; methods of discussion – were based only on Powerpoint presentations
13. Less number of participants as compared to the significance of the issue; a bit too far a place with no easy transport access to reach.
14. Participant attendance; venue.
15. Program needed improvement as it was not inclusive; methods needed improvement.
16. The place is far from the city; the issue is hot but the studies are less – more attention should be taken to show the issue for policy makers; most projects are started with good initiative but not finalized – please, reach to the end – don't stop.
17. It would have been nice if participants would have been communicated with before their arrival; also if a short summary of the presentations could have been distributed; experiences of other countries would have been a great benefit, e.g., Ghana and Kenya – where they stand – where we stand; vision, mission and values could have been uplifted.