Research Landscape and Management in Ethiopia

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Outline

- Introduction
- The Ethiopian Research Landscape
- Management of Research
- Research at AAU
- Conclusion
Outline

- Introduction
- The Ethiopian Research Landscape
- Management of Research
- Research at AAU
- Conclusion
What is research?

- is the gathering and interpreting of information to answer questions (Hyllegard, Mood, and Morrow, 1996).

- is a systematic attempt to provide answers to questions (Tuckman, 1999).

- is defined as the systematic and objective analysis and recording of controlled observations that may lead to the development of generalizations, principles, or theories, resulting in prediction and possible control of events (Best and Kahn, 1998).

- is a systematic way of asking questions and a systematic method of inquiry. (Drew, Hardman, and Hart, 1996).
Basic vs. Applied Research

**Basic**

- Pure, fundamental research
- Discovery of new knowledge; theoretical in nature
- Takes many years for the results of basic research to find some practical utility

**Applied**

- Central purpose to solve an immediate problem
- Improved products or processes
- Infers beyond the group or situation studied
- Interpretation of results relies upon Basic research
The Process of Research

• The process is initiated with a question or problem (step 1)
• Next, goals and objectives are formulated to deal with the question or problem (step 2)
• Then the research design is developed to achieve the objectives (step 3)
• Results are generated by conducting the research (step 4)
• Interpretation and analysis of results follow (step 5)
The Process of Research

**Figure 2.2.** Schematic of research process.
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Research History

Ethiopia

• has a long history, at same level with those in ancient Egypt, Persia, China and India.
• has an old tradition with outstanding engineering and technological attainments in building and construction, agriculture, food and beverage, metal works, minting, book binding, etc.

Examples are:

• The famous stele of Axum, which may be considered as one of the wonders of the world,
• the rock-hewn churches of Lalibela, considered as the finest early Christian architecture globally
• the Palaces of Gondar and the Walled City of Harar

All manifest the technological know-how of Ethiopians in the past.
Agriculture Research

• The beginning of the 1950s marks the birth of scientific agriculture in Ethiopia.

• 1952 the establishment of the Imperial Ethiopian College of Agriculture and Mechanical Arts (IECAMA).

• Beginning of the 1960s, the IECAMA had become fully operational with four academic departments (Animal Science, Plant Science, Agricultural Economics, and Agricultural Engineering)

• IECAMA ivolved and transformed first to Alemaya College of Agriculture under AAU, then to Alemaya University of Agriculture and finally to its current state of Haramaya University.

• 1966, the Institute of Agricultural Research (IAR) was established. Later renamed the Ethiopian Agricultural Research Organization (EARO) and is currently known as the Ethiopian Institute of Agricultural Research (EIAR).
Health research

• In the 1950s health research institutions officially established.

• The institutions set up by the government (outside the academia) for accelerating research activities in the country include: 1) the Ethiopian Nutrition Institute (ENI) in 1950, now merged within the Ethiopian Public Health Institute (EPHI)); 2) Pasteur Institute of Ethiopia (now EPHI) in 1951; and 3) Armauer Hanson Research Institute (AHRI) in 1969.
Research History

Natural Science Research

• Traced back to the establishment of the University College of Addis Ababa in 1950, the precursor of the AAU.

• Has been conducted within the teaching Departments and Schools of the College of Natural Sciences, the only exception being the recently established Institute of Geophysics, Space Science and Astronomy (IGSSA).

• This trend is mirrored in the other universities conducting natural science research, where only a few of the newly established research centers in the Universities of Adama, Bahir Dar, Gondar, Haramaya, Jimma and Mekele are dedicated to proper natural science research.
Research History

Engineering and Technology Research

• Started with the establishment of the Imperial College of Engineering in 1953 and the Ethio-Swedish Institute of Building Technology in 1954.

• The Ethio-Swedish Institute of Building Technology, more commonly known as the Building College, became a pioneer in starting rudimentary research in the improvement and development of building materials.

• It was only in 1974 that the staff of the Faculty of Technology (formerly College of Engineering) started to engage in applied research.
Social science and Humanities Research

• Is embedded in its ancient civilization and literate culture. The two dominant religions – Christianity and Islam – took root in the country early on in their history and gave rise to indigenous processes of knowledge creation and dissemination.

• Ultimately, it is these two traditions, particularly the Christian one that inspired what we have come to call Ethiopian studies.

• During the seventeenth century a German scholar, in fruitful partnership with an Ethiopian monk named Abba Gorgoryos, wrote the first modern history of Ethiopia, as well as Amharic and Ge’ez dictionaries and books on Amharic and Ge’ez grammar.

• Expansion of Ethiopian studies in subsequent decades include the Cushitic and Omotic south as well as the Semitic north.

• In the realm of archaeology, a German team led the first major expedition at the beginning of the twentieth century uncovering the glory of Axum. These excavations were amplified by two British expeditions later in the century, the first in the 1970s and the second in the 1990s.
Who does research in Ethiopia?

- Institutions of Higher Education (Public and Private)
  - Done by thesis/dissertation
  - Done by Research Project

- Non-university research facilities (federal and regional)

- Companies/Industries

- Societies/Foundations
Who does research in Ethiopia?

Institutions of Higher Education (Public and Private)

• Many of the universities act as centers where research, teaching, and outreach are integrated.

• Teaching, basic and applied research, and outreach activities are carried out on a wide range of themes in the agricultural, medical, engineering, natural and social sciences and humanities.

• Research expenditure at these institutions is borne by private, public (federal and regional) as well as international funding.

• Public funding to universities is disbursed by the Ministry of Education and the Ministry of Science and Technology.
Institutions of Higher Education (Public and Private)

List of Selected research performing Public and Private universities

1. Ababa Ababa University (HS, NS, ET, SSH)
2. Jimma University (AS, HS, ET, NS)
3. Bahir Dar University (HS, ET, NS, SSH)
4. Haramaya University (AS, HS, NS)
5. Mekele University (HS, ET, NS)
6. Gondar University (HS, NS)
7. Hawassa University (HS, ET)
8. Arba Minch University (HS)
9. Adama University (NS)
10. Arba Minch University (NS)
11. Unity University (SSH)
12. Etc.

AS: Agriculture Sciences; SSH: Social sciences and Humanities; NS: Natural Science; ET: Engineering & Technology; HS: Health Science;
Who does research in Ethiopia?

Non-university research facilities (federal and regional government)

Major fields of research in the government sector
  • agricultural sciences
  • medical & health sciences
  • engineering & technology
Non-university research facilities (Federal and regional government)

List of Selected research performing non-university research facilities

1. Ethiopian Agricultural Research Organization (EIAR) [15 research centers] (AS)
2. Regional Agricultural Research Institutes (RARIs) [32 research centers] (AS)
3. Ethiopian Public Health Institute [EPHI] (HS)
4. Armauer Hanson Research Institute [AHRI] (HS)
5. Ministry of Urban Development, Housing and Construction [MUDHC] (ET)
7. Ethiopian Mapping Agency (NS)
8. Meteorological Agency of Ethiopia (NS)
9. Ministry of Culture, Sports and the Young (SSH)
10. National Museum of Ethiopia (SSH)
11. National Archives and Libraries (SSH)
12. Ethiopian Development Research Institute (EDRI) (SSH)
13. Ethiopian Justice and Legal Research Institute (SSH)
15. International Peace and Security Institute (SSH)

AS: Agriculture Sciences; SSH: Social sciences and Humanities; NS: Natural Science; ET: Engineering & Technology; HS: Health Science;
Companies/Industries/Foundations/Societies

• Research undertaking is at present negligible.

• Whatever limited R&D there it tends to focus on the creation or invention of new products and services or more commonly the incremental improvement of existing products and services.
List of Selected research performing Companies/Industries

1. Metal Industry Development Institute (MIDI) (ET)
2. Leather Industry Development Institute (LIDI), (ET)
3. Textile Industry Development Institute (TIDI), (ET)

List of Selected research performing Foundations/Associations

1. Ethiopian Economic Association (SSH)
2. Ethiopian Public Health Association (HS)
3. Forum for Social Studies (SSH)
4. Entoto Observatory and Research Center (NS)

AS: Agriculture Sciences; SSH: Social sciences and Humanities; NS: Natural Science; ET: Engineering & Technology; HS: Health Science;
Challenges to Conduct Research

Challenges researchers based in Ethiopian research institutions and universities to conduct research and produce new knowledge

- Inadequate Funding for Research and Agenda Setting
- Low capacity for research
- Low research support resources
- Inefficient research administration
- Lack of demand or social appreciation for research
- Low incentives for researchers
- Poor research networking
- Weak internal and external collaboration
Research Dissemination

Workshops/Conferences
• Local
• International

Publications/Journals
• Professional Associations
• Universities
• Research Institutes
• > 35 local journals published
Research Funding

- Federal/State Government
- International grant
- Foundations and Non-Profit Organizations
- Industries
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• should respond to national demand of generating new knowledge and technology and dissemination
• should be interdisciplinary and thematic
• should strengthen and develop capacity of students in contemporary science and technology
• should be conducted in the most cost effective and responsive manner
• Research ethics should be observed in all its aspects and intellectual property rights of investigators should be maintained
Research

Strategic Planning and Priority-setting

◆ Shape what should do, not simply what can or are best equipped to do

◆ Optimal use of scarce resources (financial, human and physical)

◆ Align institutional competencies with external environment and national aspirations

◆ Balance existing capability with potential and opportunities
Research

Identifying Objectives helps

◆ To grow research capability and capacity

◆ To ensure strong research-teaching nexus

◆ To link research to wider societal responsibilities

◆ To increase and allocate resources to facilitate productivity and reward excellence

◆ To establish research clusters/centres of excellence

◆ To enhance institutional status and mission
Research

Incentives and rewards results in

◆ Greater research time
◆ Targeted grants
◆ Promotional opportunities
◆ Enhanced facilities
◆ Internships with industry or other partners
◆ Salary increases
◆ Sabbatical leave
Research

Office of Research Administration

- Financial and budget advice
- Identify funding opportunities
- Project preparation
- Project management
- Research training and mentoring
- Intellectual property and commercialisation advice
Proposal writing

Normally, it has the following;

◆ Introduction
◆ Problem statement
◆ Research objectives; general and specific
◆ Hypothesis
◆ Justification for the research
◆ Literature review
◆ Methodology – includes research design, data collection and data analysis
◆ References
◆ Work plan
◆ Budget
◆ Appendices
Research Related Important Issues

a. Setting priority research areas
b. Surveillance and monitoring of research projects
c. Standards of safety practices
d. Institutional ethical clearance
e. Investigation of allegation of research misconduct
f. Human research ethics
g. Animal research ethics
a. Setting priority research areas

**Purpose**

- to guide and identify priority research areas, standardize, assure quality of research, and dissemination of outcomes

**Priority research**

- Shall address national needs
- Identify gaps/problems of stakeholders, industry and end-users
- Shall be problem solving
- Relevant to the strategic plan
- Addressing areas of comparative advantage
b. Surveillance and monitoring of research projects

Purposes

- To gather information concerning the implementation and evolution of research projects
- To monitor approved activities are followed and resources are appropriately used
- To follow projects are on the right track to meet their objectives.
Surveillance and ...

Monitoring includes:

- Availability and utilization of resources needed by project
- Activities of each team member and their relations to project
- Assess if the work plan is being carried out and what delays or difficulties have emerged
- Compliance of the research activity with methodologies and ethical requirements
- Check on the quality of the data to answer research questions
Purpose

- Literally pertaining to life and death issues or simply about safety procedures

This includes:

- Testing facilities and their management
- Quality assurance program
- Testing reference substances
- Standard operating procedures (SOPs)
d. Institutional ethical clearance

Purpose

To determine and certify research projects (regardless of funding) confirm to regulations on health, welfare, safety, rights and privileges of research participants (subjects).

– Guidelines for research applicants (proposing) required

– Standard operating procedures (SOP) for Institutional Review Board (IRB) or Ethical Review Committee (ERC)
Institutional ...
Institutional ...

- Site monitoring, visits (when, where and how of experiments)
- Examining minutes, agenda, actions and letters
- Emergency meetings
- Communications
- Maintaining of active study files
- Maintaining confidentiality of IRB
- Audit and inspection of IRB
e. Investigation of allegation of research misconduct

Purpose

- to assist in investigations and in responding to suspected allegations of research misconduct

Research misconduct require investigation when

- There is significant departure from the norm or signed research protocols
- If committed intentionally for benefits or favors
- allegations are supported by preponderance of evidence
f. Human research ethics

Basic ethical principles

- Respect for persons
- Secure wellbeing in a strong sense of obligation
- Justice is served with fairness.
Human research ...

Applicable laws and guidelines

- National and international laws, regulations and conventions

General research ethics involving humans revolves around

- Collection and storage of samples (blood, urine, etc.)
- Confidentiality: records, interviews, images, etc.
- Privacy: declining access
- Conflict of interest: Passing information to third party for benefits, favors, etc.
g. Animal research ethics

**Purpose**

An essential tool to exercise the basic animal rights’ principles in the use and care of animals used for research or educational purposes.
Animal research ...

Justification of animal research

- Needs to have clear scientific purpose (increase knowledge for betterment of other animals and humans)
- Research with sufficient significance
- Achievable
- Familiarization of researchers to recent published materials on specifics of projects to avoid continual animal harm
- Selection of best suited animals, save endangered ones
- Serious monitoring of research
- Obligation to communicate and publish results
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Research at AAU

- Ethiopia plans to transform its economy from agriculture based to manufacturing based
- 4th ESDP envisages that university should produce trained manpower, research outputs and new technologies to support the transformation
- Importance of new technologies: adoption instead of invention
- Accordingly the Vision of AAU is to become a preeminent African research university
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<thead>
<tr>
<th>No.</th>
<th>College/Institute</th>
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<tbody>
<tr>
<td>1</td>
<td>Addis Ababa Institute of Technology</td>
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<td>2</td>
<td>Ethiopian Institute of Architecture Building Construction and Development</td>
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<td>3</td>
<td>College of Natural Sciences</td>
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<td>College of Health Sciences</td>
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<td>5</td>
<td>College of Veterinary medicine and Agriculture</td>
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<td>6</td>
<td>College of Business and Economics</td>
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<td>College of Social Sciences</td>
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<td>8</td>
<td>College of Humanities, Language Studies, Journalism and communication</td>
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<td>9</td>
<td>College of Education and Behavioral Studies</td>
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<td>10</td>
<td>College of Performing and Visual Arts</td>
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<td>11</td>
<td>College of Law and Governance Studies</td>
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<td>12</td>
<td>College of Developmental Studies</td>
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## Research Institutes

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<td>Ethiopian Institute of Water Resources</td>
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<td>Institute of Biotechnology</td>
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<td>Institute of Educational Research</td>
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<td>Institute of Peace and Security Studies</td>
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<td>Horn of Africa Regional Center and Environment Network</td>
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University-industry linkages and technology transfer

- Facilitate and manage the development of Technology incubation center
- Create link with sector ministries and Initiate problem solving research projects
- Working with several public and private sector
- Facilitate student apprenticeship
- Organize expo and exhibition that link research to companies, and technology users
Community service

- Assess professionals and agencies, from within and outside of the university, who conduct research on community services
- Create a platform where researchers, sector offices, communities and other relevant stakeholders would meet
- Work with media to provide lessons drawn from research to the public
- Provide Entrepreneurship training for prospective undergraduate students of AAU
- Implement research outputs in rural/urban communities
Research

• For the above mentioned activities, research is the bases from which knowledge and new technologies are created
• There are two kinds of research at AAU
• Externally funded projects (small and big)
  ▪ 45 research projects, 505 million birr in 1.5 years
  ▪ Thematic research projects – around 20-30 million per year
• AAU have its own history on how it comes up with thematic research approach
Ministry of Science and Technology

Research at AAU

- Addis Ababa University (AAU) has been engaged in research and community service activities since its establishment in 1950.
- There had been a need to redesign the whole landscape of research in recent past as a result of the new
  - country’s vision of being middle income in 2025 and
  - AAU becoming a preeminent research university in Africa.
- The idea flourished further when the Business Process Reengineering (BPR) started in 2008.
- BPR finding indicated that research at AAU had challenges and opportunities.
What were the Challenges?

• No research policies at AAU, faculties and research institutes
• No research priority areas
• No research incentives
• Limited results dissemination
• End-users are not involved in research design, implementation or dissemination
What were the Challenges?

• Very long, centralized and complex research process
• Fragmented research, not addressing national needs
• Research for promotion or to qualify for a certain degree
• Public was not informed about the research and hence the public was kept in the dark (e.g. no open day)
What were the Challenges?

• Research was largely influenced by donors
• Research was an affair of individuals and there was more attention to teaching, and Poor emphasis for research
• No interaction between staff to discuss research (seniors, juniors, etc.)
• No regular seminars
• Poor attendance at research seminars (no motivation to acquire new knowledge)
• No owner for research and the facilities for it (damaged or stolen equipment)
What were the Challenges?

- Inefficient purchasing of research facilities
- No quality controlling mechanism, no follow up
- Ends of many researches remain illusive
- No database, no networking
- Lengthy research approval, appraisal and funding processes
- No interconnection between graduate and research programs
- No research outcomes dissemination mechanism
What are the opportunities?

• Adequate researching staff but unevenly distributed by departments
• Opportunities for international linkage
• Location at center of country to radiate into the nations corners
• Enjoys the reputation to access customers, government offices, etc.
• Better laboratory and facilities than any other university in the country
• Some excellent research: But restricted in specific disciplines and fragmented
As a result ...

• Various works has been done to start a complete new system of research

• The Office of the Vice president for Research and Technology Transfer was re-established to take a renewed role, not only research, but also technology transfer and community services
As a result ...

Office of Vice President for Research & Technology Transfer

Officer for Publications, Communication, Event Organization

Director, Ministry of Science and Technology

Director for University-Industry Linkage and Technology Transfer

Officer of Technology Transfer, Adaptive Research, Incubation centers, Popularization, marketing, IPR

Officer/Coordinator of Graduate Research

Officer/Coordinator of Research Capacity Building, Thematic Research, Collaborative Research, Small Grants

Director for Research

College Dean

Associate Dean for RTT

DPTS

Officer of Outreach

Officer of Training & Consultancy

Director for Community Services

Director, Institute of Biotechnology

Director, Institute of Educational Research

Director, Institute of Ethiopian Studies

Director, Aklilu Lemma Institute of Pathobiology

Director, Institute of Geophysics, Space Science & Astronomy

Director, Ethiopian Institute of Water Resources
As a result ...

- Launch thematic research that addresses national development agenda that includes knowledge creation and technology transfer
- Link training and research to exceed customer satisfaction
- Put in place research policy and procedures that match the national agenda and exceed satisfaction of stakeholders and customers of research
- Research incentive policy established
- Research priority areas identified
Criteria for a Thematic Research at AAU?

• Should be in line with the new research priority areas
• Need to address a national problem with an overarching goal
• Should be multi-disciplinary, extending across more than one college/department/institute/school
• Should incorporate at least three sub-themes/research components addressing different aspects of a common problem
• Should involve a minimum of two academic staff in one sub-theme
Criteria for a Thematic Research at AAU?

- Should extend from knowledge to usable technology creation and have components that address the dissemination of outcomes of the research
- Should be problem solving, inclusive of stakeholders, industry and end-users
- Should incorporate PhD and/or Master’s thesis topics
Steps

• Call of a thematic research

• Proposal submission

• The office of the Director for Research checks that TR project submitted is as per the criteria set

• Submit TR proposal for panel of assessors

• Comments from the reviewer incorporated

• Approval by SSCRPA
Steps

- Award letter and request for a log frame matrix for one year activities
- MOA signing
- Letter to finance office
- Quarterly/midyear/annual technical and financial report
- Assess the reports (reviewers/workshop, etc)
- Disperse the next funding
Research at AAU...

• Favorable conditions for research in place at AAU now
  – AAU have now a research policy
  – Research incentive policy – 3.5 million to researcher this year
  – Intellectual property right policy
  – Decentralized administration with colleges and institutes have the power to generate and use fund
  – Subscribe to Research Africa
  – RIMS (Thompson Reuters)
  – Journal assessment scheme
Publication profile of AAU 2009 - 2012

• The AAU staff produced a total of 2119 peer-reviewed publication from 2009 to 2012.

• The contribution by the College of Natural Sciences staff was the highest (34%) followed by the College of Health Sciences (22%).

• The College of Social Sciences and the College of Veterinary Medicine and Agriculture contributed equally (about 8%) that situated both of them at the third place.
Publication profile of AAU 2009 - 2012

# of publication between 2009 - 2012 @AAU

- Y2009: 421
- Y2010: 467
- Y2011: 535
- Y2012: 601
# of publication 2009-2012 by colleges/Institutes

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<thead>
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Concluding

• Research is a powerhouse of knowledge creation

• Have to be managed and administered properly
Acknowledgements

• A team carried a consensus study on National Research Council of Ethiopia:
  • Prof. Tsige Gebre-Mariam
  • Prof. Alemayehu Teferra
  • Dr. Asfawossen Asrat
  • Prof. Bahru Zewde
  • Dr. Brhane Gebrekidan
  • Prof. Damen Haile Mariam

• Ethiopian Academy of Sciences (EAS)