
**THE FEDERAL
DEMOCRATIC REPUBLIC OF ETHIOPIA
SCIENCE, TECHNOLOGY AND
INNOVATION POLICY**

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1 INTRODUCTION

Ethiopia has adopted a national economic policy that focuses mainly on implementing the Agricultural Development Led Industrialization (ADLI) strategy. ADLI aims to bring in an effective economic growth and to build technology capability that enables the development of micro, small, medium and large industries. As the policy has been executed by applying appropriate strategies, between 2003/4-2010/11 the real GDP showed double digit growth for the eighth time in a row. Such accelerated growth has been attributed primarily to improved performance of the agricultural sector.

The growth has become more broad-based and is thereby expected to transform the country's economy from agricultural led to industrial led, at the same time creating an environment conducive to realizing overall structural change. Nevertheless, there is evidence to show that the currently prevailing economic growth will not be sustainable unless a strong national technological capability is established in the country.

In the last few decades' South East Asian countries achieved successful economic and social development mainly due to their having both an export-based market economy and accumulation of technological capabilities. This indicates that Ethiopia to support its export driven

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economy, focus must also be given to Science, Technology and Innovation (STI).

Similarly, with the objective of bringing rapid, sustainable and equitable growth thereby ensuring structural change in Ethiopia, a five year (2010/11-2014/15) “Growth and Transformation Plan (GTP)” has been implemented. The plan comprises seven strategic issues, among which the agricultural sector is expected to continue as a major source of growth while the industrial sector plays an increasingly key role in the economy.

The STI Policy presented in this document takes the national vision of *‘alleviating poverty and joining mid level income earning countries’* as expressed in the GTP as its jump-off point. It envisages the creation of a national framework that will define and support how Ethiopia will in future search for, select, adapt, and utilize appropriate and effective foreign technologies as well as addressing the establishment of national innovation system. It is clear that strengthening the integration and cooperation among various stakeholders will be of paramount importance to realize the policy’s objectives.

This policy primarily comprises general directions and major implementation strategies identified upon series of consultative discussions held with stakeholders.

2 VISION, MISSION AND OBJECTIVES OF THE I POLICY

2.1 Vision

The vision of the STI Policy is based on the national vision: “to see Ethiopia become a country where a democratic rule, good governance and social justice reigns upon the involvement and free-will of its peoples, and once extricating itself from poverty becomes a middle-income economy as of 2020-2023.” Accordingly, the national STI vision of the country is:

To see Ethiopia entrench the capabilities which enable rapid learning, adaptation and utilization of effective foreign technologies by the year 2022/23.

2.2 Mission

To create a technology transfer framework that enables the building of national capabilities in technological learning, adaptation and utilization through searching, selecting and importing effective foreign technologies in manufacturing and service providing enterprises.

2.3 Objectives

Major objectives of the policy are:

1. Establish and implement a coordinated and integrated general governance framework for building STI capacity;
2. Establish and implement an appropriate national Technology Capability Accumulation and Transfer (TeCAT) system;
3. Promote research that is geared towards technology learning and adaptation ;
4. Develop, promote and commercialize useful indigenous knowledge and technologies;
5. Define the national science and technology landscape and strengthen linkages among the different actors in the national innovation system;
6. Ensure implementation of STI activities in coordination with other economic and social development programs and plans;
7. Create conducive environment to strengthen the role of the private sector in technology transfer activities sustainably.

3 POLICY DIRECTIONS AND STRATEGIES

Eleven critical policy issues are identified, based on the national STI problem analysis and assessment of the characteristics of countries selected as benchmarks for their best practices. These are: technology transfer, human resource development, manufacturing and service providing enterprises, research, financing and incentive schemes, national quality infrastructure development, universities, research institutes, TVET institutions and industries linkage, intellectual property system, science and technology information, environmental development and protection, and international cooperation. The policy direction and strategies required for each issue are presented in following sub-sections.

3.1 Technology Transfer

The issue of technology transfer should primarily focus on devising a system of learning, adapting and utilizing as well as disposing of imported technologies in order to meet national demand. However, most technology transfer activities currently carried out in the country are not in line with the envisaged technology demands of the development programs. In general, the national capability to learn, adapt and utilize foreign technology is still at a very low stage. Hence, appropriate support will be given to create capabilities which enable to search,

select, adapt, and utilize effective foreign technologies that support development needs.

Strategies

1. Import effective and appropriate foreign technologies and create capabilities of adaptation and utilization of these technologies in manufacturing and service providing enterprises;
2. A system to search, select, adapt, utilize as well as dispose imported technologies should be established and implemented;
3. Establish and implement a system to use foreign direct investment (FDI) and other ways of supporting technology transfer;
4. Strengthen technology transfer among and between various manufacturing and service providing enterprises;
5. Strengthen wide use of intellectual propriety, standards and other related information in support of technology transfer.

3.2 Human Resource Development

To search for, select, diffuse, adapt and use technologies from other countries competent local technicians, engineers and scientists are needed. In Ethiopia the level of qualified manpower capable of transferring foreign technology is low, certainly inadequate to facilitate

the effective transfer of technology. Hence, the national education and training system will need to place emphasis on producing engineers and natural scientists in manufacturing and service providing enterprises; qualified in understanding and utilizing appropriate technologies.

Strategies

1. Develop science and technology institutions that focus on producing highly qualified technicians, engineers and scientists in line with the demand of the national economy;
2. Focus on modifying the balance of the enrollment numbers of higher education students in favor of the science and technology human resource development need of the country and conduct practical training in cooperation with industry;
3. Increase the number of females enrolling in engineering, science and TVET institutions;
4. Enable the establishment of workforce in manufacturing and service providing enterprises with the knowledge and skills necessary to learn, adapt and utilize technology.

3.3 Manufacturing and Service Providing Enterprises

The role of manufacturing and service providing enterprises in the STI sector ranges from conducting and supporting research and technology transfer activities to contributing to and implementing the policy framework. However, such enterprises have no clear value-adding linkages between them and their role in advancing the STI is not well defined in Ethiopia. Hence, assistance will be provided to strengthen micro and small enterprises development to serve as basis for the expansion of medium and large enterprises. Beside this, emphasis will be placed on the provision of support to medium and large enterprises in order to allow them to play a vital role in technology transfer.

Strategies

- 1. Support medium and large enterprises to become focal points for searching, learning, transferring, and adapting foreign technologies;*
- 2. Strengthen linkages between value chains within and between industries;*
- 3. Strengthen TVET institutions' contribution in building the capacity of micro and small enterprises.*

3.4 Research

In order for a country to have effective learning, transfer, adaptation and utilization of technology, having an effective national research system typically becomes of significant strategic importance.

In Ethiopia research is needed to address the resolution of major social and economical problems; contribute to the achievement of national development objectives; and to meet technology demand. However, it is learnt that there is a gap between the research activities and focuses in higher education and research institutions and the national development need. Hence, the national research system should be strengthened and orientated to focus on the national technological demands for searching for, learning about, adapting and utilizing effective foreign technologies.

Strategies

1. Support research institutes to develop their capacity to search, learning, adapting and utilizing effective foreign technologies;
2. Ensure research work in higher education and research institutions is in line with the technological needs of national development programs;

3. Support joint research activities among universities, research institutes and industries;
4. Support medium and large industries to establish research centers on technology adaptation.

3.5 Financing and Incentive Schemes

An effective transfer of foreign technologies requires the availability of sufficient finance. In Ethiopia there is not yet a well developed and systematized finance and incentive mechanism to support technology transfer in manufacturing and service providing enterprises. Therefore, financing and incentive schemes need to be established to support activities on searching for, learning about, adapting and utilizing of effective foreign technologies in line with national development needs.

Strategies

1. Offer various incentives to medium and large enterprises that will be involving in searching for, learning about, adapting and utilizing foreign technologies in line with the national investment policy;

2. Establish incentive schemes to award those manufacturing and service providing enterprises which show high performance gains through technology transfer;
3. Allocate resources for higher education and research institutes in line with the economical development for their contribution to technology transfer.

3.6 National Quality Infrastructure

A national quality infrastructure landscape contributes significantly to deliver quality and standardized products and services to local and international markets. Failure to meet the quality standards is one of the major problems prevailing in most of local manufacturing and service providing enterprises in Ethiopia. This is mainly due to lack of implementing standards in the national collection.

In order to solve problems related to productivity and quality thereby creating competitive manufacturing and service providing enterprises, capacitating the standardization, metrology, conformity assessment service providers and accreditation bodies would of paramount importance.

Strategies

1. Ensure the adoption of best practices on productivity, quality and safety management systems in all manufacturing and service providing enterprises;
2. Incorporate issues of national quality infrastructure in the curricula of higher education and TVET colleges;
3. Establish a credible and internationally recognized metrology system;
4. Promote and strengthen the use of standards and technical information as a tool to facilitate technology transfer;
5. Establish an effective and credible national conformity assessment system having the capacity to demonstrate the effective implementation of standards for products and services;
6. Establish a national accreditation system with international recognition as a means to demonstrate the credibility of the Ethiopian NQI;
7. Issue additional mandatory standards to conduct proper technical regulation on various products and production processes;
8. Ensure creation of strong regulatory capacities which make use of the services provided by the national quality infrastructure institutes.

3.7 Universities, Research Institutes, TVET Institutions and Industry Linkage

Universities, research institutes, TVET institutions and industry can be demonstrated to be core actors in the national innovation system. The strength as well as effectiveness of the established linkages among these institutions largely depends on their tendency and capability to be involved in activities dealing with technology transfer. As far as technology learning is concerned, the current situation of our country confirms that universities are not taking the leading role and are lagging behind the industries. Therefore, the linkages that exist among these actors should focus on contributing to capacitating the productivity of manufacturing and service providing enterprises. The shared effort should also focus on identifying appropriate technologies and their sources, understanding the technologies through learning-by-doing and adaptation as well as effective utilization. Thus, joint cooperation and support system among the actors will be established with the aim to support and facilitate the search, selection, importation, adaptation and utilization of effective foreign technologies.

Strategies

1. Establish a system that integrates and synergizes technology transfer issues among Universities, research institutes, TVET-institutions and industry;
2. Create a conducive environment for university academia and students to engage in technology transfer activities in industry;
3. Create strong linkages among universities, research institutes and industry addressing technology adaptation;
4. Establish a system that enables universities to provide an advisory role to industry in relation to technology transfer activities.

3.8 Intellectual Property System

Intellectual Property system is said to play a valuable role if it contributes to technology transfer as well as to technology capability building through FDI and technology licensing. Nevertheless, intellectual property system as a whole in Ethiopia is not playing a substantial role in accelerating technology transfer and expansion of local innovation activities. Hence, the Ethiopian IP system needs to be

designed in such a way as to support the endeavor of technology learning and adaptation as well as to protect the rights of inventors and creators and support the augmentation and application of indigenous knowledge.

Strategies

1. Make use of IP information at large in support of the efforts to build national technology capability;
2. Establish and implement a system that ensures effective protection of indigenous genetic resources and IP assets of the nation besides bringing benefit out of them.
3. Develop and implement the application of IPR systems at national and institutional level;
4. Strengthen and implement copyright protection in such a way to encourage and promote creative works;
5. strengthen trademark protection to create a healthy and competitive environment among manufacturing and service providing enterprises.

3.9 Science and Technology Information

Collecting, organizing, analyzing, disseminating, and using information related to science and technology is of significant importance for successful technology transfer. In Ethiopia there is no well organized science and technology information source or system as required by manufacturing and service providing enterprises, higher education, researcher institutes and other entities.

Despite the fact that there are certain types of information which are prepared and kept in the form of statistics, databases, indicators and bibliography, there are no mechanisms to publish and update them regularly. Therefore, it is imperative to develop and establish a national science and technology information system to fill the gaps and bring expected results, including the acceleration of technology transfer.

Establishing and strengthen such a system will create a capacity that accelerates technology transfer through identifying, gathering, organizing, analyzing, disseminating and proper utilization of science and technology information.

Strategies

1. Establish a National Science and technology information centre;
2. Support technology transfer through gathering, organizing, analyzing, and disseminating of Science and technology information;
3. Establish and implement up-to-date systems to link and exchange Science and technology information among national, regional and international information centers,;
4. Support research activities with respect to strategies and methodologies of gathering, analyzing, management and dissemination of Science and technology information;

3.10 Environmental Protection and Development

Environmental protection and development is crucial to maintain continual and sustainable economic growth. The major issues of the environment in Ethiopia are desertification, deforestation and soil erosion. In big cities lack of solid waste disposal and sewerage system are critical environmental challenges. Therefore, to address these and other environmental problems prevailing in the country, appropriate technologies will be applied in the course of natural resource utilization and implementation of various development activities.

Strategies

1. Establish a system that allows technology importation, adaptation, utilization, and disposal activities without polluting the environment;
2. Create local capabilities to learn about, adapt and adopt green technologies;
3. Establish and implement a system that addresses the safety of the environment and of society in relation to the use of equipment emitting radiation, the use of actually or potentially non ecologically-friendly chemicals and other industrial inputs actually or potentially threatening to the environment.

3.11 International Cooperation

International cooperation in the areas of science and technology is crucial for information sourcing, manpower training, expert assistance, scientific visits, collaborative research, joint ventures in technology transfer and funding of scientific and technological projects. However, the current cooperation practice of our country lacks focus, particularly on STI information sourcing, and exchange of scientists and engineers,

thereby highlighting certain particular needs for cooperation to strengthen national technology capabilities.

Therefore, the prime focus of international relations should be to encourage cooperation with developed and developing countries as well as with various international and regional organizations with the objective of building national technological capabilities.

Strategies

1. Ensure incorporation of STI capacity building elements in bilateral and multilateral agreements;
2. Strengthen exchange of professionals and scientists through South-South and North-South cooperation initiatives;
3. Initiate joint research programs with international partners, within Ethiopia, that have direct contribution to the national development agenda.

4 POLICY IMPLEMENTATION AND PRINCIPLES

This policy is an enabling framework for the establishment of a national innovation system as well as to bring in stakeholders as core actors contributing to its implementation.

The primary focuses in the implementation of the policy should be the establishment of a clear and effective STI governance structure, building technological capacity in learning about, adapting, and utilizing effective foreign technologies, as well as producing well trained technicians, engineers and scientists.

The policy will be led by the national STI council and the respective ministries will be responsible for its implementation.

The policy implementation will be based on the principles that can assure the competency and effectiveness of the national innovation system. The major principles are:

- a) The government will lead the national STI capacity building process;
- b) STI activities will be performed in an integrated manner with other social and economical activities;

- c) Increase the inclusion and participation of the private sector in innovation activities by providing support which leads to competitiveness in learning about and utilization of technology;
- d) Establish an effective, accountable and transparent system of allocation and utilization of resources for STI programs, projects and activities;
- e) Promotion and encouragement of strong integration and cooperation among national and international stakeholders to utilize science and technology infrastructure as well as to use resources effectively and efficiently;
- f) Compilation of other countries' relevant best practices and adapting them as appropriate to be compatible with the Ethiopian context.

5 GOVERNANCE OF THE NATIONAL INNOVATION SYSTEM

The governance structure of the national innovation system will be implemented in a way to lead, support and monitor the implementation of the policy. The main actors of innovation system are: National Science, Technology and Innovation Council; Ministry of Science and Technology (MoST); and other related ministries and Innovation Support and Research System.

The national innovation support and research system comprises universities, government research institutions, national laboratories, TVET institutions, financial support service providers, science and technology parks, intellectual property office, manufacturing and service providing enterprises and the agencies of the national quality infrastructure. As the aforementioned bodies are main actors in technology transfer, dissemination and research activities, they will be expected to provide financial, technical, legal and infrastructure development support for the national innovation system.

5.1 National Science, Technology and Innovation Council (NSTIC)

The membership will comprise government officials, scientists and prominent individuals from the private sector. The Chairperson and members of the **council** will be appointed by the government.

Roles and responsibilities of the council

- a) Based on consultation present recommendations on the selection and prioritization of national technology capacity building programs; Monitor and evaluate technology adaptation and utilization activities in all national priority programs;

- b) Present recommendations for resource allocation for technology capacity building out of the gross domestic product (GDP); Monitor and evaluate its implementation
- c) recommend national priority areas where support should be provided in the creation of competent human resource in science and technology, and to subsequently monitor and evaluate the implementation of such recommendations;
- d) Create and promote an environment of integration and synergy among all actors innovation system.

5.2 Ministry of Science and Technology and Other Innovation System Actors

The STI policy and recommendations of the council will be implemented by the Ministry of Science and Technology (MoST) and other respective government bodies. Effort will be exerted to ensure clarity of roles and activities, thereby preventing unnecessary task overlapping, redundant responsibilities and resource wastage.

The Ministry of Science and Technology serves as secretariat of the council. According to its proclaimed power, MoST will provide and ensure the functions of coordination, monitoring and support to STI development activities based on the strategic direction of the council.

Thus, the ministry coordinates all actors of technology transfer activities involved in technology searching, selection, acquisition, learning, adaption and utilization. In addition, the ministry evaluates and provides commentary and recommendations as to whether or not the technology capacity building activities are aligned with development programs.

In addition to MoST, other ministries having science and technology related issues play a vital role in the national innovation system and participate in human resource development, research, and implementation of technology capacity building.

6 MONITORING AND EVALUATION

Monitoring and evaluation systems will be implemented at each level in order to ensure the effectiveness of the policy implementation, efficient resource utilization and taking of corrective measure on weaknesses, with a specific responsibility resting on the council.