Linkage of Higher Education with Agricultural Research, Extension and Development in Ethiopia

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Abstract: High-level agricultural manpower training in Ethiopian institutions of higher education specialising in agriculture and related fields was studied. The study reveals that high level agricultural manpower training began in the early 1950s and that, at present, the country has seven institutions of higher learning which train students in agriculture and related fields. The results of the study show that the agricultural institutions of higher education have made contribution to the agricultural sector through training high level agricultural professionals, enhancement of indigenous research capability and generation and dissemination of technologies. The study also reveals that a host of factors have put a stranglehold on the training process and the professional competence of agricultural graduates. Moreover, the results shed new light on the programmes of study which were found to be unable to respond to the labour market requirements and current rural realities due to lack of relevance o f the curricula, which are no longer able to produce graduates who could deal with the wider problems of rural development.

Introduction

The Ethiopian economy is predominantly agricultural. Consistently, over 45% of the GDP and over 90% of exportable commodities are accounted for by the agricultural sector. Moreover, this sector provides employment for about 85% of the labour force (Belay, 2004b). However, Ethiopian agriculture is characterized by very low productivity. The average grain yield for various crops is less than 1 tonne per hectare. The animal production sub-sector experiences decreasing productivity as a result of poor management systems, shortage of feed and inadequate health-care services. The low productivity of the agricultural sector has made it difficult to attain food self-sufficiency at the national level. One of the major obstacles for the rapid development of the agricultural sector in Ethiopia is the

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scarcity of skilled and experienced labour. In this regard, agricultural institutions of higher education are expected to play a leading role in training skilled labour that can serve as a catalyst in identifying root causes for low agricultural productivity, devising appropriate remedial measures to surmount problems of food self-sufficiency and improving the traditional farming practices[1]. Yet no major effort has been made to assess the importance of these institutions in developing the agricultural sector or to look at factors contributing to their actual performance.

This paper addresses issues of high-level agricultural manpower training, research and extension in agricultural institutions of higher education in Ethiopia. In this study, agricultural higher education is understood to include diploma, first degree (B.Sc. and DVM), second degree (M.Sc. and MVSC) and terminal (Ph.D.) degree programmes offered in institutions of higher education. At present, higher education in agriculture and related fields is offered in five of the eight universities in the country. Even though the agricultural technical and vocational education and training centres are involved in training students at diploma level, due to the fact that their training programmes are different from those offered by universities and that they are of recent origin with very limited research and outreach programmes, they are excluded from this study.

The objectives of the paper are to: review the historical development of high-level agricultural manpower training, agricultural research and extension in Ethiopia; evaluate achievements of high-level agricultural manpower training programmes, agricultural research and extension systems; examine the linkage of higher education in agriculture with research and extension; assess weaknesses of higher level agricultural education, research and extension systems; identify future

[1] Especially, since the mid 1980s, the different agricultural institutions of higher learning have placed food-self sufficiency, extension, research work etc., as their primary objectives. A glance through their catalogues attests to this fact.

challenges for higher level agricultural education, research and extension systems; and summarize the main empirical findings and draw appropriate conclusions. The paper is based on a thorough review of existing empirical literature on the Ethiopian higher education system as well as discussion with officials of agricultural institutions of higher education and regional agricultural research institutions/ centres.

This paper is organized in eight parts. The first part introduces the purpose of the study undertaken. Part two deals with the agricultural education system of Ethiopia. Part three reviews the origin and development of agricultural extension and research systems in Ethiopia. Part four provides background information on higher education reform in Ethiopia. Part five examines achievements of the agricultural institutions of higher education. Part six identifies problems affecting high level agricultural manpower training in the country. Part seven explores the future challenges for agricultural institutions of higher education. Part eight summarizes the main empirical findings and draws appropriate conclusions.

The Agricultural Education System of Ethiopia

At present, the agricultural education system in Ethiopia is understood to include the following types of educational institutions which offer training programmes at different levels: Agricultural Institutions of Higher Education; Agricultural Technical and Vocational Education and Training Centres; and Farmer Training Centres. In what follows, the origin and development of these institutions are discussed.

Agricultural Institutions of Higher Education

Agricultural Institutions of Higher Education (AIHE), as defined in this paper, include those institutions of higher education that offer at least one of the following training programmes in agriculture and related fields after successful completion of the secondary school curriculum (twelve years of elementary and secondary schooling): Diploma

Programme (two years of training) destined to produce essentially middle-level technicians in a variety of subjects; Undergraduate Degree Programme leading to a first degree (B.Sc./DVM) after three to five years of study; and Graduate Programmes leading to a Master's degree (M.Sc./MVSC) and Doctor's degree (Ph.D.).

University level agricultural education in Ethiopia began in the early 1950s, following the 'Point Four General Agreement for Technical Co-operation between the United States of America and the Ethiopian Empire', which was signed in Addis Ababa on 16 June 1951. This agreement became the working plan and legal basis for the country's agricultural education programme. On 15 May 1952, the Agreement for a Co-operative Agricultural Education Programme between The Imperial Ethiopian Government and the Government of the United States of America was signed in Addis Ababa. This agreement laid down the foundations for the establishment of the Jimma Agricultural and Technical School (JATS) and the Imperial Ethiopian College of Agriculture and Mechanical Arts (IECAMA) popularly called 'Alemaya College of Agriculture', now Alemaya University (AU). On the following day, 16 May 1952, another agreement signed between the Technical Co-operation Administration of the United States Department of State, now United States Agency for International Development (USAID), and Oklahoma Agricultural and Mechanical College, now Oklahoma State University, gave to the latter the mandate to establish and operate the College; to establish and operate a nationwide system of agricultural extension; to set up agricultural research and experiment stations; and to furnish technicians and administrative staff to start the Alemaya College.

Based on the then Emperor's suggestion and the recommendation from Oklahoma State University, it was decided to establish the college at Alemaya, 525 km to the East of Addis Ababa. The academic programme of the College was modelled on the Land-grant College system with three fundamental but related responsibilities: training of highly skilled workers, promotion of agricultural research, and dissemination of appropriate technologies. The first classes of

JATS started in October 1952 and the first university-level agricultural training programme, with a 4-year curriculum leading to a Bachelor of Science degree in General Agriculture, started in September 1953 at the JATS. The JATS was to serve as an interim site where students complete their freshman and sophomore course requirements during the course of constructing different facilities at Alemaya. The IECAMA opened its doors to its first batch of students on 5 November 1956. The original curriculum of the College was to produce graduates with B.Sc. degree in General Agriculture. Gradually, however, adapting the training programmes to the felt needs of the country led to the introduction of new programmes of study[2].

The IECAMA was originally conceived as an independent institution administered by a president with the advice and counsel of Trustees. With the foundation of the Haile Selassie I University, now Addis Ababa University (AAU), in February 1961, the College became one of the chartered units of the University and was renamed 'Haile Selassie I University College of Agriculture'. The College functioned as a chartered member of the AAU till 27 May 1985 when it was upgraded to a university level as Alemaya University of Agriculture. Since July 1994, the AU has been governed by a Board. In reflecting the diversity of the training programmes offered at Alemaya, following the recommendation of the University Senate in December 1999, the University Board renamed the University, Alemaya University.

Until the middle of the 1970s, university level education in agriculture and related fields was offered at Alemaya College of Agriculture, the Institute of Animal Health Assistants, Ambo and Jimma Institutes of Agriculture. The Institute of Animal Health Assistants was established

[2] The undergraduate training programmes of the university are now organized in eight faculties/ colleges. These are the College of Agriculture, Faculty of Business and Economics, Faculty of Continuing Education, Faculty of Education, Faculty of Health Sciences, Faculty of Law, Faculty of Technology and Faculty of Veterinary Medicine. Moreover, since the 1978/79 academic year the University has been offering postgraduate training in different fields of agriculture. At present, the University runs 14 M.Sc. and 4 Ph.D. programmes in various fields of agriculture.

in 1963 at Debre Zeit (50 km East of Addis Ababa) subsequent to an agreement reached between the Ethiopian Government and the Food and Agricultural Organisation (FAO) of the United Nations. The institute granted a two-year diploma in Animal Health until this programme was phased out in 2004. The institute was patronised, first by the Ministry of Agriculture and then by the Commission for Higher Education. In 1989, it was made a constituent part of the Faculty of Veterinary Medicine of the Addis Ababa University.

Ambo and Jimma Institutes of Agriculture were primarily intended for the training of agricultural technicians. The Ambo Agricultural Institute was established in 1931. It is one of the oldest institution and the first agricultural school in the country to teach agriculture at primary level. Until 1966, the Ambo and Jimma Institutes were secondary schools taking in students who had completed grade eight and providing them four years of general education with major emphasis on agriculture. In 1967 these schools became Institutes of Agriculture giving two years of diploma training in general agriculture and were put under the Ministry of Agriculture[3]. In 1978, these institutes were upgraded to the College of Agriculture level. At present, these Colleges are under the Jimma University. The Jimma College of Agriculture was renamed by the University as the Jimma College of Agriculture and Veterinary Medicine in 2005. Since the second half of the 1970s, the following junior colleges of agriculture and other agriculture related institutions were set up.

Debre Zeit Junior College of Agriculture

This College was founded in what was formerly known as the Debre Zeit Agricultural Experiment Station, which was established in 1953 to serve as the first experimental station of the IECAMA. The Debre Zeit station later developed as an autonomous agricultural experiment

[3] The contract of the USAID expired in 1965, leaving all the activities of the JATS in the hands of the Ministry of Agriculture.

station under the auspices of the Addis Ababa University. In September, 1977, a two-year diploma granting institution was attached to the station and the whole unit was renamed Debre Zeit Junior College of Agriculture and Agricultural Research Centre. In February 1984, the junior college programme of the Debre Zeit centre was discontinued and transferred temporarily to Alemaya. The programme phased out at the end of the 1987/88 academic year. With the interruption of the junior college programme, Alemaya regained control over the experimental station and the latter was renamed Alemaya University of Agriculture, Debre Zeit Agricultural Research Centre. However, with the reorganisation of the country's agricultural research system, in 1997, the Debre Zeit Agricultural Research Centre was placed under the Ethiopian Agricultural Research Organisation.

Awassa College of Agriculture

The College was founded in July 1976 in Awassa (275 km south of Addis Ababa). It was formerly under the administration of Addis Ababa University and was reorganised as an independent institution, in 1994, under the administration of the Ministry of Education. The College now runs different programmes in agriculture both at B.Sc. and M.Sc. degree levels. Following the establishment of the Debub University in 2000, the College became one of its constituent parts.

Wondo Genet College of Forestry

The College is located 275 km south of Addis Ababa and was opened in early 1978. Till the second half of the 1990s, the College used to offer only a two-year diploma programme in forestry. At the end of the 1997/98 academic year the four-year B.Sc. training programme in Forestry was transferred from Alemaya University to the Wondo Genet College of Forestry. The College now runs different programmes in forestry both at B.Sc. and M.Sc. degree levels. The College was initially administered by the Ministry of Agriculture and then by the Higher Education Main Department of the Ministry of

Education. Following the establishment of the Debub University in 2000, the College became one of its constituent parts.

Faculty of Veterinary Medicine

The Faculty was established in 1979 at Debre Zeit on the site of what used to be known as the Institute of Animal Health Assistants. Its primary objective is the training of high level manpower in the area of animal health and awards a degree of Doctor of Veterinary Medicine (DVM). The Faculty is under Addis Ababa University.

Faculty of Dry Land Agriculture and Natural Resources of Mekele University

In 1993, the *Faculty of Dry Land Agriculture and Natural Resources* started its training programme as part of a newly *opened* college, namely the Mekele University College, which is located in Tigray (783 km north of Addis Ababa). This Faculty trains students in dry land agriculture and was under the Higher Education Main Department of the Ministry of Education till 2000, when it became a constituent part of the Mekele University. The College started M.Sc. training programmes in the 2004/05 academic year.

Agricultural Technical and Vocational Education and Training (ATVET)

The ATVET centres in their current form are of recent origin in this country. The great majority of the ATVET centres were opened in 2001. The Education and Training Policy of 1994 underlines that technical training would be provided for those who completed grade ten (the first cycle of two years of secondary education) for the development of middle level manpower (TGE, 1994). Consistent with this policy, the first group of students who completed general secondary education joined the Technical and Vocational Education and Training centres in 2001.

Currently, there are 25 ATVET centres, under the Federal Ministry of Agriculture and Rural Development, which train middle level agricultural manpower in the areas of Animal Health, Animal Sciences, Cooperatives, Natural Resources Management and Plant Sciences. The total duration of study in ATVET centres is three years, two years of study on campus and a ten-month apprenticeship with close supervision in the final year. The training programmes of ATVET centres are designed in such a way that 30% of the programme would focus on theoretical aspects and the remaining 70% on hands-on practical training, which includes a ten-month apprenticeship in the final year. Graduates from ATVET centres are placed at the level of peasant associations and work as development agents. In the 2003/04 academic year, the ATVET centres enrolled a total of 37,579 (13,178 first year, 14,967 second year and 9,434 third year students) students in the different fields of study (MoE, 2005).

Farmer Training Centres (FTC)

Another component of the agricultural education system is Farmer Training Centres (FTCs), which offer modular training programmes for practitioners who are either primary school dropouts or adults with farming experience. The FTCs train farmers for 3 months (300 hours, 2 days per week) on practical skills. In addition, recognizing the gaps in animal health service delivery, particularly in the pastoralist and remote areas, the Federal Ministry of Agriculture and Rural Development has introduced community-based animal health care delivery system. For this purpose, it has developed new curricula and prepared guidelines for the training of community-based animal health workers (CAHWs). Communities select candidates who would serve as CAHWs and the training is conducted by a government-accredited trainer (MOARD, 2004). The plan of the current government is to establish 15,000 Farmer Training Centres throughout the country.

Origin and Development of Agricultural Extension and Research Systems

Agricultural research and extension work started in Ethiopia with the establishment of the Imperial Ethiopian College of Agriculture and Mechanical Arts. In the decade following its establishment, IECAMA was active in building the national agricultural research and extension systems. In 1963, the national agricultural extension work was transferred to the Ministry of Agriculture, with the suggestion that IECAMA concentrates its outreach efforts in its vicinity. Since that time, the Ministry of Agriculture has been the sole authority responsible for the national agricultural extension system. Following the transfer of the responsibility for national extension administration to the Ministry of Agriculture, extension service became one of the departments in the Ministry. Over the years the Ministry has implemented different extension approaches, such as the comprehensive package programme, the minimum package programme, the peasant agriculture development extension programme, and since 1995, the Participatory Demonstration and Training Extension System (PADETES)[4].

PADETES was adopted from the Sasakawa Global 2000 (SG 2000) extension strategy, initiated in Ethiopia in 1993 by the Sasakawa Africa Association and the Global 2000 of the Carter Centre. PADETES was developed after a critical evaluation of the past extension approaches and the experience of SG 2000. Its major

[4] With the change in government in 1991, the country was divided into 9 semi-autonomous administrative regions on the basis of ethnic, linguistic and cultural identity, one federal capital (Addis Ababa) and one special administrative division (Dire Dawa). At present, extension activities are the entire responsibility of regional agricultural bureaus. The extension division of the federal Ministry of Agriculture is charged with the task of co-ordinating inter-regional extension work, providing policy advice on nationwide agricultural extension issues, advising regional bureaus of agriculture in the areas of extension management and administration, developing extension training materials and organizing training programmes in agricultural extension for regional extension personnel. The regions are given full autonomy in the planning, execution, monitoring and evaluation of extension programmes.

objectives include increasing production and productivity of small-scale farmers through research-generated information and technologies, increasing the level of food self-sufficiency, increasing the supply of industrial and export crops, and ensuring the rehabilitation and conservation of the natural resource base of the country. The system gives special consideration to the package approach to agricultural development. Initially, PADETES promoted cereal production packages and the beneficiaries were mainly those farmers who live in high rainfall areas of the country. Over the years, however, the packages have been diversified to address the needs of farmers who live in different agro-ecological zones of the country.

A closer scrutiny of the different extension approaches reveals that they have been planned and implemented without the participation of the very people for whom they have been designed. Apart from being biased against the livestock sub-sector, these approaches have captured farmers located only a few kilometres from both sides of all-weather roads (Belay, 2003). The success of extension work depends partly on the quality and number of front-line workers. However, at present the number of extension personnel in the country is very small when viewed in relation to the number of farmers they have to serve (Belay, 2004b).

As to agricultural research, as discussed earlier, it was first initiated by IECAMA. In fact, for more than a decade, the College and its central experiment station at Debre Zeit had a national mandate to carry out and co-ordinate agricultural research. In 1966, the Imperial Government transferred the responsibility for agricultural research to the newly established Institute of Agricultural Research (IAR). The IAR was established in February, 1966 with a mandate to formulate the national agricultural research policy, to carry out agricultural research on crops, livestock, natural resources, and related disciplines in various agro-ecological zones of the country, and to coordinate national agricultural research (Negarit Gazeta, 1966). With the establishment of the IAR, agricultural higher education, agricultural research and extension split up and were made

answerable to three separate and independent administrative structures. This structural change nipped in the bud the burgeoning linkage among agricultural research, extension and education systems. This weakness persisted until now during which there has been no clear mechanism of linkage among the Ministry of Agriculture, the national agricultural research system and agricultural institutions of higher education.

Since the establishment of IAR, Ethiopia has a national agricultural research system with an autonomous management and with major and minor stations covering the major ecological zones, and the major commodity and discipline groups. Until its replacement by the Ethiopian Agricultural Research Organization in 1997, the IAR had been the only organization in the country with a clear mandate solely for agricultural research. Over the years, other organizations, which had been involved in agriculture related research activities, had been established under the Ministry of Agriculture. These included: the Plant Protection Research Centre (PPRC), which was established in 1972 and operated under the Ethiopian Science and Technology Commission and was merged with IAR in 1995; the Plant Genetic Resources Centre of Ethiopia, which was founded in 1974, which later became the Biodiversity Institute (BDI); the Forestry Research Centre (FRC), which was established in 1975; the Wood Utilization Research Centre (WURC), which was founded in 1979; the National Soils Laboratory (NSL), which was established in 1989; and the Institute of Animal Health Research (IAHR), which became operational in 1992 (Getinet and Tadesse, 1999).

In addition to the aforementioned organizations, other organizations, such as some divisions of the Ministry of Agriculture, the Coffee and Tea Development Authority and the former Ministry of State Farms Development had been engaged in experimental work in support of their development activities. Moreover, some institutions of higher learning, such as the Alemaya University, the Awassa College of Agriculture, the Mekele University's Faculty of Dry land Agriculture and Natural Resources, and the different units of Addis Ababa

University (Faculty of Veterinary Medicine, Institute of Development Research and the Department of Biology) have been doing some agriculture related research.

Agricultural research underwent significant reform in the 1990s when the new government committed itself to put in place a decentralized political system in the country. More precisely, in 1993, some IAR centres were decentralised to create independent research centres run by the respective regional governments, and became the Regional Agricultural Research Centres (RARCs), generally under their respective regional bureaus of agriculture. However, over the past five years, the Amhara, Oromia, Somali, Southern and Tigray regions have established their respective Regional Agricultural Research Institutes (RARIs), which have agricultural research as their central mandate and coordinate research activities of agricultural research centres within their respective regions.

As discussed earlier, agricultural research has been undertaken by different organizations without proper co-ordination. The end result was duplication of efforts and wastage of resources, which proved to be an extravagance the country could ill afford. The problem seems to have been appreciated by the current government for it reorganized the national agricultural research system, in June 1997, under the umbrella of the newly created Ethiopian Agricultural Research Organization (EARO). During its establishment, EARO merged all existing agricultural research institutions (IAR, BDI, FRC, WURC, IAHR, NSL and the Debre Zeit Agricultural Research Centre) except the Regional Agricultural Research Centres. Proclamation number 79/1997, which established the EARO, states that its objectives are: to generate, develop and adapt agricultural technologies that focus on the needs of the overall agricultural development and its beneficiaries; coordinate research activities of agricultural research centres or higher learning institutes and other related establishments which undertake agricultural research on contractual bases; build up a research capacity and establish a system that will make agricultural research efficient, effective and based on development needs; and

popularize agricultural research results (Federal Negarit Gazeta, 1997). In view of rationalising agricultural research governance and avoiding redundancy of efforts and wastage of resources, EARO prepared a ten-year strategic plan that would guide agricultural research policy in Ethiopia[5].

The current National Agricultural Research System (NARS) is made up of three types of institutions:

- The Ethiopian Agricultural Research Organization (consisting of the different research institutions/centres which were merged within EARO during its establishment).
- The Regional Agricultural Research Centres/Institutions (RARCs/ RARIs)

These are the second largest of the NARS institutions. The RARCs/ RARIs conduct research that address the specific needs of a particular region. They promote multidisciplinary research at the regional level. They also participate in collaborative national research programmes in any one or more of the crop, livestock, and natural resource commodity programmes (Getinet and Tadesse, 1999). EARO funds the budget requirement of research projects that are approved by a national review forum and have national implications. Regional governments fund the remainder of research projects that focus on the specific agricultural problems of the agro-ecological zones in each region. Currently, there are 39 Regional Agricultural Research Centres[6]. Some of these

[5] The strategy is based on 18 agro-ecological zones and 7 main focal areas. These are: crops, animal science, forestry,soil and water, dry-land agriculture, socio-economics,and regional extension and farmer linkages.

[6] They are located at Adet, Andassa, Bahirdar (two centres, namely the Bahirdar Agricultural Mechanization Research Centre and the Bahirdar Fisheries Research Centre) Debre Berhan, Gondar, Sekota, Sirinka in the Amhara region; Adami Tulu, Bako, Bedelle, Fitche, Mechara, Nekempt, Sinnana, Yabello, Zwai (two centres, namely the Zwai Agricultural Research centre and the Zwai Fisheries Research Centre) in the Oromia region. In addition to the agricultural research

RARCs were established over the last three years with the financial support from the World Bank supported Agricultural Research and Training Project. Even though the number of RARCs has increased significantly over the last five years and attempts have been made to cover agro-ecological zones that are not covered by the EARO, given the country's ecological diversity, it will still take many years before technologies suitable to the different locations of the country are developed.

- Agricultural Institutions of Higher Education

Among the AIHE those that are actively engaged in agricultural research both through direct involvement of the staff and graduate students' thesis research work include Addis Ababa University's Faculty of Veterinary Medicine, Alemaya University's College of Agriculture, Debub University's Awassa College of Agriculture and Wondo Genet College of Forestry, and Mekele University's Faculty of Dry land Agriculture and Natural Resources.

With regard to the performance of the national agricultural research system, in its fifty years of existence, it has developed and released about 390 improved varieties of crops (including varieties which are no more in production) over the last three decades (Belay, 2004b). In addition to improved varieties, numerous agronomic practices such as plant population, spacing, fertiliser rates and application methods, physical and chemical crop protection practices, water and soil conservation techniques have been identified, evaluated and recommended.

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centres, Rural Technology Research and Multiplication centres are established in Assela, Bako, Harar and Jimma areas of the Oromia region; Awassa, Areka, Bonga and Jinka in the Southern Region; Abegele, Alamata, Axum, Humera, Mai Tsebri, Mekele (two centres, namely Mekele Agricultural Research centre and Aynalem Rural Technology Research and Multiplication centre) in the Tigrai region; Gode, Fafen, and Jijiga in the Somai region; Abobo in the Gambela region, and Shiket in the Afar region.

It should be noted that most of the released varieties were developed and tested in high potential areas of the country where the agricultural research centres are located. Given that the research centres in the country are very limited and do not represent all the agro-ecological zones, it was not uncommon to see some technologies developed and tested in specific areas being disseminated in other areas without proper adaptability trials[7].

As already noted, agricultural research and extension have been carried out by different bodies and as the linkage and working relationships among these organisations have been non-existent, researchers have been engaged in research activities which were not on the farmers' priority list. Consequently, farmers have become increasingly sceptical to adopt technologies developed by researchers, a fact that stems from the non-participatory manner by which research problems are identified and prioritised. As part of a move to strengthen the linkage between the agricultural research and extension systems and improve their performance, the Ethiopian Agricultural Research Organization was made accountable to the Federal Ministry of Agriculture and Rural Development in March 2004. This reorganization brought the national agricultural research and extension systems under one umbrella.

Background Information on Higher Education Reform in Ethiopia

As Institutions of Higher Education in Ethiopia and that in the middle of a reform process and as part of the higher education system, and that the AIHE are required to be open, flexible and capable of efficiently adapting to changes in the agricultural sector and the wider external environment, a bit of highlight about the higher education reform process is in order so as to provide a proper perspective for

[7] Most of the research centres are located in the major agro-ecological zones of the country. However, the arid and semi-arid zones, mainly the north western and northern drought-prone sub-moist zones, and the eastern region of the country comprising western and eastern Hararghe and the Somali and Afar regions, are least addressed.

Subsequent discussions.

The need to reform the Ethiopian higher education system was first sensed in 1994 when the Transitional Government of Ethiopia issued the Education and Training Policy (TGE, 1994). The policy has stressed issues of quality and relevance in educational programmes; quality of teaching staff and facilities; improvement of learning process towards a focus on students; improvement of management and leadership; introduction of financial diversification, including income generation and cost-sharing by students; and improvement in the system of evaluation, monitoring, autonomy and accountability. Since the second half of the 1990s, a series of workshops and consultative meetings with the higher education community, focusing on the reform agenda and the role of Institutions of Higher Education (IHE) in the reform process, have been held.

Other policy documents that underscored the need for reform in the higher education system and the importance of making the curricula more relevant and responsive to the country's trained manpower needs both in quality and quantity include: the Rural Development Policies, Strategies and Instruments (2001), the Ethiopian Sustainable Development and Poverty Reduction Programme document (2002), and the Capacity Building Strategy and Programmes (2002). However, detailed strategies to operationalize the reform agenda were developed in the following documents: the Education Sector Development Programme II (MoE, 2002a), the Higher Education Capacity Building Programme (MoE, 2002b), the Higher Education Proclamation issued in 2003 (FDRE, 2003), the report of the Higher Education Strategy Overhaul Committee of Inquiry into Governance, Leadership and Management in Ethiopia's Higher Education System (MoE, 2004) and the World Bank's working paper on Higher Education Development for Ethiopia (World Bank, 2004).

New legal frameworks for reform were created with the issuance of the Higher Education Proclamation (FDRE, 2003). The provisions of the proclamation include: guaranteeing increased administrative and

financial autonomy to institutions; introduction of cost sharing in the form of a graduate tax; adoption of more business-like attitudes and practices by institutions; a move towards a new funding arrangement (block grant budgeting system using a funding formula); and the establishment of the Education Relevance and Quality Agency (ERQA) and the Ethiopian Higher Education Strategy Institute (EHESI). ERQA is commissioned to develop standards of quality and relevance, evaluate programmes and institutions, and advise the Ministry of Education on issues of accreditation and recognition. Like wise, EHESI is entrusted with the responsibility of developing visions and strategic directions, analyzing policies and strategies, and advising the government so as to make higher education compatible with the country's manpower needs.

It is too early to evaluate the outcomes of the higher education reform which is being implemented in all IHE. Even though it is difficult to confirm the veracity of the reports, during the regular bi-monthly consultative meetings, the heads of the public IHE have been consistently reporting that their institutions have been making steady progress towards reform. The regular bi-monthly consultative meetings convened by the Ministry of Education have helped board members, university administrators and staff members understand their roles in shared governance. In what follows, the various reform-related activities that the institutions of higher education and the Ministry of Education have implemented so far are presented.

The reforms introduced so far could be seen at two levels: national and institutional. At the national level, three system support agencies, namely the ERQA, the EHESI and the National Pedagogical Resource Centre were set up. A Development Innovation Fund aimed at providing grants on a competitive basis to public institutions was established. Moreover, four sector wide projects, funded by the Royal Netherlands Government, aimed at building the capacity of the IHE and providing material and technical support to the higher education sector have been operational since the first half of 2005. The first of these projects is the Education Quality Improvement

Project, which strives to improve the teaching and learning activities in the IHE by providing resources, training and support to key staff members who after training would serve as resource persons for the Academic Development Centres of the IHE. The second project is aimed at strengthening and providing support to the Higher Education Strategy Institute and the Educational Relevance and Quality Agency. The third project, namely the Leadership and Management Development Project is aimed at improving the knowledge, skills and attitudes of the existing top- and middle management of IHE. The fourth project, the Information Communication Technology project, is designed to assist IHE in developing and maintaining their information systems, including computerized student records and financial management.

In addition to the four sector wide projects, another project (the higher education link project) funded by the Royal Netherlands Government provides support to the development of Faculties of Law in Bahirdar and Jimma Universities, Faculties of Veterinary Medicine in Alemaya and Gondar Universities, Faculties of Medicine in Debub and Mekele Universities, and Departments of Computer Sciences and Information Technology in Arbaminch and Bahirdar Universities. The principal objective of the higher education link project is to assist the concerned faculties in upgrading their staff, improving their teaching facilities, establishing international networking relationships with sister institutions outside the country, and improving their curricula so as to make them responsive to labour market requirements.

At the institutional level, as part of the reform process, institutions have been carrying out measures that include curriculum review (with due emphasis on practical training and ethical values and principles), shortening of the first degree programmes by one year, expansion and diversification of programmes, rapid increases in enrolments, introduction of cost sharing, training staff members at M.Sc. and Ph.D. levels, and contracting non-academic services to private

providers[8]. Institutions of higher education are also in the process of redefining their missions and embracing a culture of forward planning through well thought out strategic plans.

More precisely, institutions have been expanding their programmes in terms of student enrolments, new B.Sc. (in all IHE), M.Sc. (only in Addis Ababa, Alemaya, Debub, and Mekele Universities), and Ph.D. (only in Addis Ababa and Alemaya Universities) programmes as well as a sizeable increase in enrolments of existing programmes. Diploma programmes (two years of post-high school studies) were phased out from the university systems and taken over by regional government institutions. To accommodate the expansion of programmes and the rapid increases in enrolments, massive construction of infrastructure (dormitories, laboratories, libraries, classrooms, lecture halls, cafeterias, computer centres, offices and the like) and procurement of different items (equipment, facilities, furniture, textbooks and reference materials) have been carried out. To meet the surging demand for instructors created by the expansion of the programmes and higher student intakes, employment of expatriate instructors has been pursued as a major strategy. The expatriates are expected to stay in the IHE until those staff members under training return and take up their positions. However, in all institutions the demand for qualified and experienced academic staff far exceeds the supply.

All staff members of the Faculties of Education in all IHE have been trained on student-centred approach to education and on experiential

[8] With respect to the rapid increase in enrolments, the total enrolment in IHE has increased from about 25,000 (53.2% regular and 46.8% continuing education) in the1993/94 academic year to 172,111 (76.3% in public and 22.7% in private and non-governmental institutions) in the 2003/2004 academic year (MoE, 1995, 2005). During the same period, the number of universities increased from two to eight. Similarly, the annual intake of the public higher education institutions which was only 6,503 (53.3% diploma and 46.7% degree students) in the 1993/94 academic year increased to 31,921 (all degree students) in the 2004/05 academic year (MoE, 1995; Teshome, 2005b).

education strategies on the ground that these approaches are more aligned with the skills (life long learning, inter-personal, higher order thinking, and communication skills as well as specialized and general knowledge) needed in the workforce of the increasingly competitive labour market environment. Moreover, centres for academic development were established in all institutions and they are believed to help the process of internal quality assurance.

As already noted, one vital component of the reform process was curriculum review. The IHE were given the responsibility of revising and adapting their curricula to meet national demand for competent and skilled manpower as well as to respond quickly enough to changes in the environment and to the demands expressed by the ever-diversifying clientele of higher education. The process of curricula revision and development was completed (often without the involvement of key stakeholders) in all institutions in 2003. However, it is important to note that revision and development of curricula should be a participatory exercise that involves all key stakeholders, including teachers, community members, employers (government, non-governmental organizations and private sector), former graduates, and students. One clear indication of the problem of developing curricula without the participation of key stakeholders is the fact that the current curricula for two B.Sc. degree programmes (Animal Production and Health and Crop Production and Protection) aimed at meeting the human resource requirements of the Agricultural Technical and Vocational Education and Training Centres are on the process of being revised, only two years after their introduction. According to a recent review, the heads and staff members of the ATVET reported that the current curricula for these two programmes were not tuned to the needs of ATVET in that they were judged less relevant in terms of producing graduates with knowledge and skills required to staff ATVET (Mashilla *et al.*, 2005).

In the course of the curriculum revision process, in view of producing graduates with core competence, problem solving, good communication and entrepreneurial skills (as underlined in the

Education and Training Policy), skills development projects/courses (that go by names such as practical attachment programme, internship, field practice, community oriented practical education) that place students in the community for a period of 2 to 6 months, depending on the programmes of study, were incorporated into the curricula. In addition to providing hands-on practical training to the students, the inclusion of these types of practical training elements within the programmes of study was believed to have the advantage of forging closer ties with communities and making the programmes more responsive to their needs.

Achievements of Agricultural Institutions of Higher Education

In recent years agricultural institutions of higher education have been under increasing governmental pressure to make direct, visible, and relevant contribution to national research and development. More precisely, teaching, research, and outreach programmes of agricultural institutions of higher education are expected to be in line with national strategies for meeting the challenges of food security, economic growth, and sustainable environmental management (Amare, 2004; Belay, 2004a; FDRE, 2002; Teshome, 2005a). In this section, the achievements of AIHE in terms of manpower training, research outputs and provision of extension services are discussed.

Manpower Training

Agricultural institutions of higher education have made contribution to the agricultural sector principally through providing agricultural education to prepare men and women for work in the agricultural research extension and other support services. As already noted, there are noticeable differences among the training programmes of institutions of higher education in agriculture and related fields. To date, all these institutions were able to produce 35,696 graduates. Out of this group, 741 were awarded M.Sc. degrees, 76 Master of Veterinary Science degrees, 541 Doctor of Veterinary Medicine (DVM) degrees, 9,741 Bachelor degrees, and 24,624 diplomas. Table

1 shows the number of diploma and degree graduates from the various colleges by field of study. Available evidence shows that the number of graduates from agricultural institutions of higher education is very small compared with the country's demand for qualified agricultural professionals.

Table 1: Number of Graduates from Institutions of Higher Education in Agriculture and Related Fields, by August 2005

Institution /College / Faculty and Department	Continuing Education		Regular Programme	
	Diploma	Degree	Diploma	Degree
I Ambo College of Agriculture				
- General Agriculture	1450	-	3569	-
- Agricultural Teachers	130	-	263	-
Sub-total	1580	-	3832	-
II Awassa College of Agriculture				
- Agricultural Engineering and Mechanisation	167	-	1071	234
- Animal Production & Range Land Management	172	6	1026	377
- General Agriculture	413	-	839	-
- Home Science & Technology	456	-	672	58
- Plant Production & Dry Land Farming	-	108	-	358
- Plant Science and Technology	594	-	1369	-
- Agricultural Education (Summer)	232	-	-	-
Sub-total	2034	114	4977	1027
III Debre Zeit Junior College of Agriculture				
- Animal Production & Protection Technology	-	-	189	-
- Crop Production & Protection Technology	-	-	403	-
- Horticultural Production & protection Technology	-	-	19	-
	-	-	384	-
- Rural Economy & Social Development	-	13	-	-
- General Agriculture	-	13	995	-
Sub-total				
IV Faculty of Veterinary Medicine	-	-	1890	-
- Animal Health	-	-	-	541
- Veterinary Medicine (DVM)	-	-	-	54
- Tropical Veterinary Epidemiology (MVSC)	-	-	-	22
- Tropical Veterinary Medicine (MVSC)	-	-	1890	617
Sub-total	1179			
V Jimma College of Agriculture	-	-	4364	-
- General Agriculture	-	-	236	-
- Animal Sciences	-	-	486	-
- Plant Sciences	1179	-	86	161
- Horticulture		-	5172	161
Sub-total				
VI Wondo Genet College of Forestry	167	99	1472	344
- General Forestry	-	-	-	92
- Production Forestry/Farm Forestry (M.Sc.)	-	-	-	44[a]
- Forest Management	167	99	1472	480

Sub-total				
VII Mekele University, Faculty of Agriculture	-	58	-	178
- Animal and Range Sciences	-	104	-	223
- Dry land Crop Production & Horticultural	72	-	-	-
Sciences	-	73	-	302
- Soil and Water Conservation	159	-	-	-
- Land Resource Management & Environ.	231	235	-	703
Protection				
- General Agriculture	-			30
Sub-total	82		287	1409
VIII Alemaya University, College of Agriculture	-		-	(124)[b]
- Agribusiness management	123	24	180	897 (41)
- Agricultural Economics	117	21	250	1239
- Agricultural Engineering				(134)
- Animal Sciences				2337
- Plant Sciences				(346)
- General Agriculture				90
- Agricultural Extension				564 (4)
- Agricultural Education				27
- Soil & Water Conservation			56	38
- Arid Zone Crop Production	322	45	773	38
- Forestry				260
- Home Economics				-
Sub-total				6929 (649)
Total	5513	506	19111	9917 (649)

a- This was a special B.Sc. programme which was organised and run under the auspices of The Swedish University of Agricultural Sciences (SUAS) between 1986/87 and 1989/90 academic years.
b- Figures in parentheses indicate the number of M.Sc. graduates in the different fields of specialization
Source: Records Offices of the Respective Colleges (Faculties)

Graduates of the AIHE have been serving the country as extension agents, development workers, subject matter specialists, teachers, researchers, experts, heads of different offices, consultants, etc. Information concerning the occupational distribution of the graduates from AIHE is difficult to obtain. However, available evidence shows that graduates from the AIHE have been playing leading roles in the agricultural research and development endeavours of the country. For instance, over the 1960-2005 period, 7 of the 17 Ministers and 11 of the 17 Vice Ministers of the Ministry of Agriculture, were graduates from Alemaya University[9]. Similarly, in the 1966-2005 period, 8 of the

[9] The year 1960 is used as a period of reference due to the fact that Ethiopian nationals with B.Sc. degrees in agriculture from Alemaya University started filling different positions in the Ministry of Agriculture at about this time.

10 General Managers/Director Generals and 6 of the 7 Deputy General Managers/Deputy Director Generals of the Ethiopian Agricultural Research Organization (former Institute of Agricultural Research), were graduates from Alemaya University.

It is also gratifying to note that the need to build and strengthen human resource development capacity of AIHE to meet the high demand for skilled agricultural professionals to staff agricultural agencies has been given high priority and support by the current government. In this respect, it is important to note that over the last five years 15 new first degree programmes aimed at training students in various fields of agriculture (8 in Alemaya, 3 in Ambo, 6 in Awassa, 5 in Jimma, 3 in Mekele and 3 in Wondo Genet) were launched. Likewise, during the same period, 33 new postgraduate (27 M.Sc. and 4 Ph.D.) in agriculture were started in four of the seven AIHE (8 M.Sc. and 4 Ph.D. at Alemaya, 7 M.Sc. in Awassa, 8 M.Sc. in Debre Zeit, 4 M.Sc. in Mekele and 2 M.Sc. in Wondo Genet).

Research Outputs and Provision of Extension Services

It is evident that manpower training is the primary mission of AIHE. However, in addition to their primary function, AIHE are expected to play a developmental role by establishing linkages with public, private and non-governmental organizations engaged in agricultural, rural development and farming communities. Available evidence shows that in Ethiopia AIHE have been involved in agricultural research and extension activities, although there have been some differences in emphasis from one institution to another. Some AIHE (like the Ambo College of Agriculture, and the Jimma College of Agriculture and Veterinary Medicine) serve only as teaching institutions, and others take part in research and/or extension activities. However, only AU has been participating actively in the NARS. More precisely, unlike other AIHE, AU has been commissioned to conduct adaptive and applied research to support development in Eastern Ethiopia and in this capacity it shares responsibility for public sector agricultural research in the country (see for example, Table A-3 in the annex).

In addition to their direct involvement in agricultural research activities, the AIHE have been contributing to research capacity development of the country mainly through producing qualified manpower for the NARS and upgrading the professional skills of NARS staff through short-term, summer and in-service training programmes. A closer look into the research performance of the AIHE reveals that, thus far, they have developed and released 120 crop varieties (36 wheat, 25 maize, 21 sorghum, 10 potato, 10 *teff*, 7 chickpea, 7 lentil, 2 haricot bean, and 2 groundnut varieties) and 16 different technologies. Analysis of the research outputs of individual institutions reveals that not all AIHE have been developing and releasing improved technologies/varieties. More precisely, of the 120 crop varieties and 16 technologies produced and released by the AIHE, 117 crop varieties and all of the 16 technologies were accounted for by Alemaya University (the College of Agriculture at Alemaya and the Debre Zeit Agricultural Research Station) and the remaining 3 crop varieties (maize) by the Awassa College of Agriculture.

The principal drawback of agricultural research in AIHE is that many research projects have often addressed topics of personal interest (with the goal of publishing results) and have been found to be less relevant to the basic and urgent needs of poor farmers (Amare, 2004; Belay, 2004a; Teshome, 2004). Of equal importance, but often unnoticed by the researchers, is the fact that in most instances farmers have not been encouraged to take part in the identification of research problems. Moreover, researchers have paid little regard to the farmers' opinions, attitudes, customs, practices and priorities. In general, research efforts should fall in line with the needs and pressing problems of farmers so that research results become more acceptable and meaningful to farmers.

Factors that explain the limited involvement of agricultural institutions of higher education in development-oriented agricultural research programmes include, among others, lack of funding for university research; missing incentives for university staff to do research;

absence of linkages with users and potential clients of research; missing functions of planning, coordination, and evaluation of research at the AIHE; absence of an explicit mandate for national agricultural research; and absence of research priorities related to national research needs (not addressing national agricultural research priorities). It is also important to note that until very recently, all institutions of higher education measured academic achievement of staff members (and thus promoted them to the next higher academic rank) in terms of publishing research results in internationally recognized scientific journals. However, in 1997 AU took a bold measure to recognize and thus use locally-oriented research results (generation of improved technologies and practices that address local needs) for promotion purpose. Currently, this criterion is incorporated in the promotion guidelines of all institutions of higher education in the country.

With respect to the linkages between AIHE and the different components of the NARS, the author's discussion with the general managers of the Southern and the Tigray Agricultural Research Institutes and the heads of Debrezeit and Jimma agricultural research centres, where four of the current seven AIHE are located, revealed the existence of limited interactions between AIHE and the different components of the NARS. This view is shared by the heads of the AIHE in question. It was also reported that the collaborations and interactions took the form of conducting joint research, attending periodic meetings of different committees, participation in research review workshops, involvement of the research staff in the academic programmes of the AIHE (teaching courses both at undergraduate and post-graduate levels, supervising postgraduate thesis research work, and serving as members of board of examiners during thesis defence sessions). The discussion with officials of the research centres and the AIHE further points to the fact that where collaborations and interactions were reported, they tended to be limited between individuals (in both AIHE and other components of the NARS) rather than between the institutions in which they work. It is, however, heartening to learn that the Southern Agricultural

Research Institute envisages pursuing an innovative approach to forge closer working relationships with the Debub University. The new approach focuses on funding M.Sc. thesis research projects of students enrolled in the School of Graduate Studies of the Debub University on condition that they work on high-priority areas of the southern region.

As already noted, the existing linkages between agricultural institutions of higher education and other components of the NARS are weak. A review of experience from other countries shows that it is possible to design different mechanisms to improve these linkages. These mechanisms could take the form of: utilizing research infrastructure jointly; institutionalizing and facilitating staff exchange (creating conducive conditions whereby senior NARS staff spend part of their time, teaching and supervising graduate students, at AIHE and *vice versa*); maintaining the current good practice of convening regular consultation meetings and reviewing research projects jointly; encouraging joint research projects.

Available evidence shows that AIHE have traditionally engaged in agricultural research, but less in agricultural extension. However, during the past few years, outreach programmes by AIHE seem to have gained importance as shown in the following table.

Table 2: Involvement of Agricultural Institutions of Higher Education in Extension Activities

Institution	On-farm research/ observation plots	Result/ method demonstration/ tours on research plots	Farmers'/ field days	Training of farmers	Distribution of leaflets/bulletin/ extension manuals	Advisory services to farmers
Faculty of Veterinary Medicine				X^a	X^a	X^a
Alemaya University	X	X	X	X^a	X^a	X^a
Debub/Awassa	X^b	X		X^a	X^a	
Debub/Wondo Genet	X^b					
Jimma/Ambo College	X^b	X^a				
Jimma/Jimma College						X^a
Mekele University	X^b	X		X^a	X^a	

X: activities carried out on regular basis X^a: activities carried out occasionally
X^b: activities started recently as part of externally funded projects

Table 2 shows clearly that extension activities of AIHE include training extension workers and farmers, preparing extension booklets and manuals, conducting on-farm trials/observation plots, organizing farmers' day/field day, undertaking result/method demonstrations, organizing field trips, and providing advisory services. Those AIHE which undertake extension activities use both group and individual extension methods to extend new knowledge and skills to farmers. However, as can be seen in Table 2, most of the AIHE have not been rendering agricultural extension services on regular basis.

As indicated in Table 2, five of the seven AIHE reported to have been involved in undertaking on-farm research activities (four of these five institutions underlined that they had started on-farm research work after having secured the required resources through foreign funded projects). Similarly, four of the seven AIHE reported to have had experience in producing and distributing technical leaflets and extension training manuals, meant to be used in agricultural extension. It is, however, important to note that these materials were prepared occasionally and they were not always prepared in languages that farmers could understand. Table 2 shows also

that only three of the seven AIHE have been engaged in providing technical assistance and advisory services. The AIHE staff members' provision of technical assistance and advisory service to farmers seems to be limited to those farmers who live in close proximity to the institutions. A closer look at Table 2 indicates that Alemaya University seems to be better placed than other AIHE in terms of rendering a range of agricultural extension services to farmers. However, there is clear indication that because of logistic and time constraint some of these services were not provided on regular basis.

With respect to the linkages between agricultural institutions of higher education and the national agricultural extension system, they take the following forms: conducting research on extension needs and methodologies (through graduate research programmes of Alemaya University; preparing extension booklets and materials; training extension workers/farmers/subject matter specialists; and producing qualified manpower for the national agricultural extension system (this refers particularly to the Bachelor degree programmes in Agricultural Extension offered at Alemaya University).

Problems Facing Agricultural Institutions of Higher Education

Problems facing institutions of higher learning in agriculture and related fields differ from one institution to another and are very complex and diverse. In what follows only those problems which are not institution specific and which apply to all will be presented.

Shortage of Highly Qualified, Competent and Experienced National Staff

The ability of institutions of higher education in agriculture and related fields to attain their mandates is heavily dependent on the quality and experience of their staff. The present staffing situation of these institutions reveals that highly qualified and experienced teachers and researchers leave the higher education system to work for the private sector, NGOs, international organizations, or foreign universities/research centres. This problem is believed to have diverse causes, which include, among others, low salaries of staff compared to private and non-governmental organizations, non-competitive terms of service, poor social services, and lack of rewards for outstanding research and teaching. Because of the high turn over of

experienced teaching and research staff**,** the transfer of experience and knowledge to junior faculty members, which has given institutions of higher learning their character and values, has broken down. Moreover, at present, there are different signs that point to the fact that most of those remaining in the higher education system have been involved in informal activities in view of supplementing their inadequate basic income. These activities take the form of doing a second job for another employer, part-time teaching elsewhere or moonlighting that misuse the working time of those involved and their respective institutions' hardware and software. The involvement of teaching and research staff in informal activities is believed to impact on the quality of teaching and research output, the time available for consultations with students and outreach activities.

The current staffing situation in all IHE raises serious concerns related to the quality of research work and teachings. In fact, high turn over of experienced teaching staff coupled with a sharp rise in the student population forced the institutions to rely heavily on recruiting young Ethiopians (with little or no teaching and research experience) and foreign nationals. The IHE are now dominated by quite young national staff who are not very experienced and foreign nationals who have little or no basic knowledge of Ethiopia. It must be noted that in recent years, IHE have been facing considerable difficulties in recruiting young academics that in most cases prefer to work for non-governmental organizations and the private sector which offer higher pay and better working conditions.

Table 3: Full time Ethiopian & Expatriate Teaching Staff by Institution and Academic Rank (2003/04 A.Y, 1st Semester)

	Professor		Associate Professor		Assistant Professor		Lecturer		Assistant Lecturer		Graduate Assistant		Total	
Institution	ET	EX	ET	EXP	ET	EX	ET	EX	ET	EX	ET	EX	ET	EX
Addis Ababa	29	45	149	31	257	38	464	11	86	-	82	-	1067	125
Alemaya	1	17	6	14	40	11	67	18	8	-	45	-	167	60
Arbaminch	-	5	-	3	3	21	30	18	-	-	33	-	66	47
Bahirdar	-	-	1	2	19	10	86	23	34	-	61	-	201	35
Debub	1	8	3	4	35	37	148	36	49	-	75	-	311	85
Gondar	-	4	9	2	28	8	48	9	15	2	27	1	127	26
Jimma	1	6	4	5	62	17	128	34	46	-	104	-	345	62
Mekele	-	4	2	7	15	20	70	15	33	2	58	2	178	50
Nazereth	-	4	-	-	-	4	41	10	30	-	36	-	107	18
Total	32	93	174	68	459	166	1082	174	301	4	521	3	2569	508

ET: Ethiopian EX: Expatriate
Source: Ministry of Education (2005)

A closer look at Table 3 reveals that in the 2003/04 academic year 16.7 % of the instructors working in the IHE of the country were non-Ethiopians. More precisely, expatriate staff members made up 74.4 % of the professors, 28 % of the associate professors, 26.6 % of the assistant professors, 13.8 % of the lecturers, 1.3 % of the assistant lecturers, and 0.6 % of the graduate assistants working in the IHE of the country in the 2003/04 academic year. It is also interesting to note that of the 2,569 Ethiopian staff members teaching in the IHE in the same academic year, 20.3 %, 11.7 %, 42.1 %, 17.9 %, 6.8 %, and 1.2 % were graduate assistants, assistant lecturers, lecturers, assistant professors, associate professors, and professors, respectively.

It is to be noted that the higher education community appear to believe that in the higher education reform that is currently being implemented, there is an overemphasis on bricks and mortar (buildings, furniture, equipment, consumables, etc.) relative to investing in people (teachers, researchers, and creative innovative research), adopting an attractive remuneration system and putting in place an enabling environment.

Shortage of Supplies/ Equipment and Inadequate Facilities

The availability of basic materials and teaching aids, like photocopy machines, computers, audio-visual aids, etc. is very important in facilitating the activities of instructors and harmonising the teaching-learning process. At present, in most institutions, there is either a serious shortage or an absolute lack of supplies and facilities required for adequate teaching. In spite of the steady increment in the student population of the institutions of higher education, since the second-half of the 1990s, classrooms, dormitories, cafeterias, health services and laboratory facilities have not grown to commensurate degree. This has led to the utilisation of the existing facilities in excess of their capacity, in turn resulting in class congestion, difficulty in giving adequate attention to students, etc.

Shortage/ Lack of Library Materials

Up-to-date and specialised literature and references are essential for the realisation of the different objectives of the institutions of higher learning. At present, most of the books and periodicals available in these institutions are very old, outdated, and of very limited relevance to the courses being taught. It is worth noting, for example, that training in improved agricultural methods and production management skills is among the most important activities of institutions of higher education in agriculture. This, however, requires that the staff keep pace with the recent advances in their respective areas of specialisation and current, topical and specialised reading materials be easily available to them through purchase or borrowing. The current problem of library materials will be compounded if one takes into account the near non-availability of publications focussing on Ethiopia in all these institutions.

Weak Practical Training Component

A closer look at the agricultural higher education system in Ethiopia reveals that most of the agricultural curricula have not been adjusted to the new requirements and demands for trained manpower in agriculture. Moreover, students of agriculture are given heavy doses of theory, without any exposure to real-life agricultural problems and environments similar to those they face after graduation. This is believed to have resulted in producing

graduates who lack technical competence and professional confidence to work in the complex and changing rural environment (Amare, 2004; Belay, 2000; 2004a; Mashilla *et al.*, 2005). However, the demand for greater educational relevance and better-trained graduates has never been greater. In recent years, with the growing student population, the AIHE were forced to stretch their existing facilities to the limit. This proved to be particularly detrimental to the practical component of the training programmes. Thus, students would not be taught to appreciate the basic problems facing agriculture in contemporary Ethiopia, thereby not preparing them fully for what will be expected of them after graduation. Moreover, feedback from the AIHE reveals that because of budgetary limitations, it was practically impossible to implement the practical attachment/community-oriented practical education programmes as planned. It must be mentioned *en passant* that there is an underlying feeling among the higher education community that shortening the length of study makes the programmes too tight and the graduates will not gain enough practical training demanded by the job market

Narrowly-focussed Programmes of Study

Over the past twenty years, AIHE in developing countries have been under increasing pressure from governments and donors to reform the traditional disciplinary system, that focused on agricultural production and productivity, and embrace more market-oriented, demand-driven multidisciplinary systems approach, taking into account the complex requirements of agriculture and rural development as well as the changing needs and realities in the face of globalization (Lindley, 2000; Maguire, 2000; Willett, 1998).

It is increasingly recognized that in addition to courses pertaining to their areas of specialization, students of AIHE must take some important interdisciplinary courses which would help them understand the broad principles of agricultural production and rural development and would eventually prepare them in the best possible manner for the world of work. Some of the frequently suggested cross-cutting themes that all students of the AIHE must be exposed to include basic leadership development skills, interpersonal communication skills, agribusiness and marketing, demographic challenges, environmental protection, the empowerment of women, gender issues, sustainable development, participatory approaches to rural development, the role of indigenous knowledge systems, food

security, computer literacy, and the effects of HIV/AIDS on the agricultural sector (Amare, 2004; Lindley, 2000; Maguire, 2000; Willett, 1998). Available evidence shows that at present in the Ethiopian AIHE only very few of the aforementioned issues are addressed through interdisciplinary courses due mainly to the problem of fitting additional courses into an already crowded curriculum (the duration of study for first degree was reduced by one year).

Teaching Programmes with Little Reference to the Ethiopian Conditions

Recent studies on Ethiopian agricultural higher education sub-system found that traditional agricultural higher education failed to respond to the labour market requirements and current rural realities due to lack of relevance of the curriculum, which is no longer able to produce graduates who could deal with the wider problems of rural development (Amare, 2004; Belay, 2000, 2004a; Mashilla *et al.*, 2005). The problem is compounded by the fact that standard textbooks and/or teaching materials relevant to the Ethiopian conditions are lacking for many of the courses taught in the AIHE. The absence of teaching materials which are relevant to Ethiopia, coupled with limited circulation of the results of the different research projects undertaken in the country, have led to the utilisation of western and mostly theoretical textbooks and reference materials. This has resulted in students not being exposed to the objective realities of their country and having little comprehension of the root causes of its backwardness, an awareness of which is required for economic development to take place in Ethiopia.

Weak Inter-institutional Linkage

The majority of the institutions of higher learning in Ethiopia today can be qualified as being introvert because of the weak relationships they maintain with sister institutions and other organisations. Consequently, this has seriously affected inter-institutional ties. In order to correct these drawbacks it is essential that institutions of higher education establish strong linkages among themselves and also work in close collaboration with local or foreign academic and research institutions and development organisation in terms of: exchange of professional (educational and research) information, staff exchange and sharing, collaboration in research work, effective use of financial & material assistance, participation in curriculum development, etc.

Weak Connection with Other Parts of the Agricultural Education System

The current agricultural education system in the country consists of disconnected programmes/training tracks leading to different diplomas and professional careers (farmer training centres, ATVET, AIHE). The institutions that offer these programmes are under the control of different ministries and there is no (or only little) co-operation and communication among themselves. It is, therefore, advisable to move towards more integrated agricultural training programmes and institutional framework through which graduates of the lower training tracks would have access to join and pursue their studies at higher training tracks, if they so wish. Such an approach is also believed to enable the various levels of agricultural education and training to play complementary and reinforcing roles in order to meet the objectives of sustainable economic development, poverty alleviation, environmental protection, and food security at national, regional, local and household levels.

Lack of Communication with Key Stakeholders

Regular contact with key stakeholders (employers and former graduates) and periodic tracer studies are essential elements that help identify the strengths and weaknesses of training programmes. Strong linkages with key stakeholders also help to recognize changes in the external environment and improve the quality and relevance of the programmes. At present, the AIHE in the country are not proactive in terms of adapting in response to changing needs and realities in the external environment as well as maintaining strong linkages with key stakeholders.

Future Challenges for Agricultural Institutions of Higher Education

The demand for competent and experienced professionals has always been high in Ethiopia. However, supply has continuously fallen short of demand. The country's capacity to train higher-level personnel is below current requirements, mainly because of the extreme limitation of space in institutions of higher learning. To address the problem of skilled manpower, the Ethiopian Government is engaged in reorganizing higher education institutions, including expansion of higher education activities to more

regions and increasing institutional independence. In the expansion process, the public IHE are expected to play a leading role in training high-level professionals. In this respect, in 2009, the annual undergraduate intake of the IHE is planned to reach between 150,000 and 160, 000 (110,000 in the public and 40,000-50,000 in the private institutions) (Teshome, 2005b). The same source reveals that the annual graduate intake of the public IHE is planned to reach 21,000 in 2009. It is quite obvious that the envisaged increment in the number of students and the launching of new programmes of study would be a mammoth challenge to the public IHEs.

It is increasingly clear that, in recent years, AIHE, like all IHE in the country, have been under pressure to enrol more students than could be effectively served. The surging number of students in AIHE, in the face of insufficient resources, is believed to have led to a decline in the quality of education (Amare, 2004; Belay, 2000, 2004a; Mashilla *et al.*, 2005). Shortage of highly qualified and experienced instructors, insufficient attention being given to research/knowledge creation and practical training, lack/shortage of teaching materials which are pertinent to the agricultural situation of Ethiopia, as well as teaching methods and curricula that have not been adjusted to the new requirements and demands for trained manpower in agriculture have made the situation worse.

Given this state of affairs, the fundamental challenge facing the agricultural higher education sub-system in Ethiopia is to transform itself in view of adapting to the ever changing external environment. It is therefore incumbent upon the AIHE to implement curricular reform measures, adopt student-centred creative learning strategies, and introduce more practical elements into study programmes so as to be able to produce graduates equipped with the knowledge, skills, values and attitudes required for promoting sustainable agricultural and rural development. This paper made it clear that one of the most important challenges facing AIHE is national staff retention. In this respect, it is high time for public authorities and policy makers to take into consideration the long-term effects of exodus of highly qualified and experienced staff to areas of higher pay and better working conditions. It is, therefore, important that concerted efforts be made to lure young and outstanding professionals into the higher education system and retain experienced teaching and research staff by providing better pay, working facilities, adequate incentives and competitive terms of employment. With respect to research activities of AIHE, it is imperative that

they direct their research attentions to problems of local relevance and define their research agenda through interaction with all relevant stakeholders if they want their research efforts to mean anything at all to the society in which they are embedded.

Conclusion

Studies carried out in many developing countries have concluded that investing in human resources development is essential for poverty reduction, efficient utilisation of available resources, and economic development. In Ethiopia, given the fact that there has been no tracer study, it is very difficult to quantify the real contribution of graduates in agriculture and related fields to economic development. However, one can safely say that institutions of higher education in agriculture and related fields have been, in general, contributing positively to the national development efforts because in their absence there would not have been the progress achieved so far. This paper has identified common problems facing institutions of higher learning in agriculture and related fields, which need to be properly addressed if the institutions are to contribute their fair share to the agricultural development endeavour of the nation. In fact, in light of the many and varied challenges facing the AIHE, their response must be to go beyond the traditional ways of imparting too much theoretical knowledge and produce competent and confident graduates with entrepreneurial skills and abilities to deal with the wider problems of rural development.

As discussed earlier, the need for high-level agricultural manpower remains pressing and dire. In this respect, even though concerted efforts have been made to strengthen AIHE and improve their contribution to the agricultural development of the nation, over the last 5 years, mainly through procuring educational facilities, constructing additional buildings and employing expatriate professionals, severe bottlenecks have still to be eliminated. These include: national staff retention, interconnecting all levels of the agricultural education and training systems, improving the quality and relevance of programmes, developing wider linkages with key stakeholders, other AIHE, other institutions in other sectors, foreign universities and research centres, and forging closer ties with the labour market so as to ensure that AIHE are producing the kinds of experts demanded by the changing labour market environment.

With respect to agricultural research performance of AIHE, their contribution to the national agricultural research agenda is very marginal in that among all AIHE only Alemaya University has been actively engaged in research endeavours addressing national agricultural research priorities. It is therefore imperative to strengthen the research activities of AIHE and improve their contribution to development-oriented national agricultural research programmes. In this respect, some of the measures that need to be taken include the following: defining research priorities oriented to needs of users, creating budget line for university research; providing strong incentives for conducting research; promoting multi-disciplinary research on societal problems; allocating realistic time to research, teaching and other activities (under the current system AIHE staff should devote 25 percent of their time to research and outreach programmes but this is rarely the case); and at the national level agricultural research and extension strategies need to recognize and define the roles of AIHE in research and extension. It is equally important that AIHE formulate their research strategic plans taking into account national agricultural research priorities and relevant local considerations (preparation of research strategy outlining research priorities and how research is linked to users, other components of the NARS, and the teaching and extension programmes of the AIHE).

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