ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

SCHOOL OF INFORMATION STUDIES FOR AFRICA

INFORMATION TECHNOLOGY APPLICATION IN INSTITUTIONS OF HIGHER LEARNING IN ETHIOPIA WITH SPECIAL REFERENCE TO COMPUTER APPLICATIONS.

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT

FOR THE DEGREE OF MASTER OF SCIENCE IN INFORMATION SCIENCE

BY

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DECLARATION

The thesis is my original work and has not been presented for a degree in any other university.

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The thesis has been submitted for examination with my approval as a university advisor.

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ABSTRACT

Every society and individual need information in the performance of its day to day tasks. Timely, reliable and pertinent information is required to be presented in a form and format convenient to the potential user(s). Information is needed for gainful decision making, effective and efficient planning and management and increasing productivity in all sectors and all walks of life; it is needed to support education at all levels, to enhance the quality of life and to create an informed citizenry to sustain democracy. In this regard computers are becoming increasingly more efficient and effective tools for the processing, storing, and retrieving and delivery of information in various fields of human endeavour. Developments in information technology, in which computer technology is the principal core, provide a unique opportunity for developing countries to accelerate their socio economic development. However, there are constraints and difficulties that hinder the acquisition, maintenance and effective application of the technology.

The present study surveyed through questionnaires, interviews, and site visits the current level of application of computers in Institutions of Higher Learning in Ethiopia. The situation is not satisfactory as a whole.

- The establishment of a higher body at the national level to promote cooperation in computer technology in institutions of higher learning in Ethiopia should be considered. The body's functions will be to promote and guide the development of computer related resources and their application in order to anticipate and meet the future needs of Higher Learning Institutions. Additionally, the body can help in mediating and catalyzing exchange of ideas and information among institutions within and outside the country.

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The study indicated that some institutions do not have any computer facilities at all, while those that have encounter problems in their use. The problems relate to capacity, compatibility, and maintenance of hardware, the software used, and the quality and number of trained personnel available for the proper handling of computers and information systems. There are also organizational problems and administrative constraints.

Based on the findings of the study, the following principal recommendations are offered :

- Institutions should be encouraged to treat the acquisition of computers as an investment supported by clear-cut definition of computer needs, and technical and economic evaluations.

- Open access to staff, with proper security like pass words, may hasten the development of experience with computers.

- Under Higher Education, various training institutions should be established and appropriate courses given in order to promote education and training in computer technology.

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- Under Higher Education, various training institutions should be established and appropriate courses given in order to promote education and training in computer technology.

LIST OF TABLES

ABBREVIATIONS

AAU - Addis Ababa University.

HEMD - Higher Education Main Department.

IDRC - International Development Research Centre.

ILCA - International Livestock Centre for Africa.

IT - Information Technology.

NSTIDC - National Scientific and Technological Information and Documentation Centre.

PADIS - Pan African Development Information System.

SISA - School of Information Studies for Africa.

UNESCO - United Nations Educational Scientific and Cultural Organization.

CHAPTER ONE

INTRODUCTION

1.1 STATEMENT OF THE PROBLEM AND ITS IMPORTANCE

Present day society is information dependent. Information is one of the most important resources vital in nearly every aspect of our personal and working lives and our society. All sectors of society and activities of individuals depend on the efficient handling of information. There is a rapidly growing demand for information by and ever-widening range of users - educators, researchers, policy makers, managers and the public at large - for the effective and efficient performance of the many tasks and to contribute to the socio-economic and cultural development of the societies they live in.

The information explosion of the last couple of decades has meant a tremendous proliferation of information, which in turn has resulted in more difficult problems of locating the right information at the time it is required. The growth of information available is indeed in a very marked contrast to the limited time available to the information researcher and user. The vital contribution that information technology is making in this connection is well recognized. A perusal of the information and computing press reveals the emergence and

availability of a number of new technologies (commonly referred to as Information Technology) that are effective and efficient tools to the information searcher and user.

The term Information Technology (IT) coined in the 1970's, has developed from the interaction and convergence of a number of core technologies related to the generation, processing, and dissemination of information. it is generally considered that there are atleast three of these, namely, microelectronics, computing and communications. In particular, one would wish to emphasize the special relevance of these last two technologies (computing and communications), particularly in view of their potential for revolutionizing the way that society handles information. Their benefits, in general, might be grouped into four types:

. Cost saving : If all data and information are stored electronically, the cost of paper and the space needed to store bulky paper could be reduced to a significant extent.

. There will be higher productivity from existing resources.

. They may be used to improve information availability to executives for their decision making.

- Enhancement of institutional management efficiency: reduction of wastage of manpower resources, optimal use of physical and computer facilities, financial resources, etc.

Computers as with the rest of information technologies, are currently in a state of flux. Their versatility in all kinds of information processing application is having a profound effect not only in the developed world, but also in the educational, business, industrial and governmental procedures in the developing countries. As far as education is concerned there are two parts to be considered - one dealing with computer design and development, the other treating the computer as a tool. Of particular interest to us is the later - specially the use of computers as a tool in promoting research, teaching and sharing of information between institutions of tertiary level education in Ethiopia.

Although computers are now being used in some institutions of higher learning in Ethiopia, their use has primarily started from and mostly limited to, teaching. This however, is inadequate when judged by the potential for their use, and the considerable demand in other areas. Especially in most institutions, more and more researchers are constantly being confronted with issues of the potentials of computers to aid their research activities. Of particular importance, in

this connection, is the potential of computers in information storage and retrieval, including library automation and research data analysis.

Libraries in most institutions are not capable of providing information support service for research and experiment work. Such inadequate information provision capability is threatening the institutions' ability to promote research and teaching. To this end, not only must each institution establish inhouse information provision facilities to support research and teaching, but it must also seriously consider ways of effectively interacting with other institutions for the purpose of pooling experience and facilitate cooperation. This, however, renders the need for an assessment of the extent to which information technology has already penetrated the higher learning community and the constraints and difficulties that hinder its effective application. Therefore it was felt this research could contribute significantly to the study and analysis of the problem.

The emphasis in this research project is, therefore, to study the specific application of information technology in higher learning institutions in Ethiopia with special emphasis on computer application : their present use and the problems encountered which may be the cause for the non-optimal use of

the technology.

It is also expected that the final result of the study will serve as a first step for designing a more detailed investigation of the potential for information technology and also to form the basis for computer-based information exchange between higher learning institutions. It may suggest possible solutions and give recommendations that may lead to more productive applications of information technology.

Since no exhaustive study has been carried out to assess the present status of application of computers in higher learning institutions in Ethiopia, it is hoped that it will stimulate further research on the subject.

1.2 SCOPE AND OBJECTIVE

Even though information technology consists of many kinds of technologies, the scope of the study is limited to the computer technologies available in the institutions and their applications.

The overall objective of this study is to assess the availability of, and accessibility to, computer and related technologies for information work in institutions of higher learning in Ethiopia.

Specifically the study will attempt to :

- identify the types of information technologies currently available in such institutions and the extent of utilization;

- assess the present status of application of computer technology in Institutions of Higher Learning in Ethiopia and the problems encountered in the use of computers;

- assess the availability of professional manpower for proper handling of computers as well as processing of information;

- identify deficiencies in the infrastructure that contribute to the non-use and non-optimal use of the technologies; and

- recommend measures to correct the identified deficiencies and suggest appropriate strategies for acquisition and utilization of computers.

1.3 LIMITATION AND PROBLEMS

Since the objective of this study was to cover higher learning institutions, it was planned to collect information from all higher learning institutions of Ethiopia. However, because of security reasons in Harar region, information on Alemaya University of Agriculture is not included in the study.

The study considered only those institutions whose computers were already operational at the time of the survey, but not those under acquisition or on order.

There was also the usual problem of not getting the questionnaires returned on time, which made the survey take more time than was initially expected. However, almost a complete survey was made on the higher learning institutions in Ethiopia.

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- identify deficiencies in the infrastructure that contribute to the non-use and non-optimal use of the technologies; and

CHAPTER TWO

INFORMATION TECHNOLOGY

2.1 BASIC CONCEPTS AND DEFINITION

Information technology is a relatively recent concept. It was apparently coined in the 1970's and has come into its own in the 1980's. Its emergence was hastened with the introduction of digital techniques into telecommunications which are compatible with modern data processing technology. With such a rapidly changing area, it has been difficult to define the topic. Many people use information technology synonymously with computer science, others broaden the definition to encompass telecommunications.

some sample definitions from the literature include the following:

Valerie, in the Dictionary of Computing (OUP,1986) defines information technology as 'any form of technology, i.e any equipment or technique, used to handle information. It incorporates the whole of computing and telecommunications technology together with major parts of consumer electronics and broadcasting.'.

Longley and Shain(1986) define information technology as 'the acquisition, processing, storage and dissemination of vocal, pictorial, textual and numerical information by microelectronics based combination of computing, telecommunications and video.....[Information Technology] has arisen as a separate technology by the convergence of **computing, telecommunications and video techniques.'.**

The Chambers' Science and Technology Dictionary (Cambridge, Chambers,1988) defines information technology as **'the application to information processing of current technologies from computing, telecommunications and** microelectronics', where information processing refers to the organization, manipulation and distribution of information.

Jenny(1986) defines information technology as 'the acquisition, processing, storage and dissemination of various types of information via computers and telecommunications.'.

From the foregoing definitions, it appears that there is a general consensus, but no specific agreement on what information technology is. But we may ask the question why information technology is becoming a subject of wide-ranging discussion. There are a number of reasons. From a social point of view it promises changes in the way we communicate and reach decisions. Even before the invention of computers,

telecommunications, radio and television helped people get information about distant events and new ideas. They promoted their understanding of the complexities of the surrounding world and in turn increased that complexity by making a greater degree of interaction among people.

The application of computers to information handling has contributed to the dimension of complexity, through its ability to store and process vast amounts of data at high speed. Thus the improved technological tools for collecting data and storing have encouraged applications of information technologies in many areas.

As could be realized from the above definitions and discussions, information technology has emerged from the convergence of data processing techniques and telecommunications, where the data processing technique provides the ability to process and store information and telecommunications for communicating it.

The next section deals with the uses and applications of information technology in various fields of human endeavour.

directly linked to a computer system. As a sale is made, the bar code placed on the item is scanned and a record of the sale is stored on the auxiliary storage of the computer system. In addition to printing a detailed grocery list for the customer along with the total price, inventory records are updated to reflect the fact that an item has been sold. Besides keeping track of the sales and inventory, computers allow sales personnel to validate personal checks used by customers, to verify a valid credit card purchase, and to more accurately determine the change in a cash transaction.

Research: Computers are a breakthrough for the scientific community, supporting research activities. The computers' ability to collect and analyze data has given researchers a processing potential that they can experiment with indefinitely. Scientists can create mathematical models of any event and use the computer to simulate the model's reaction to any set of conditions. Many economists and government officials depend on similar models to monitor and project government spending and economic conditions. Other scientists examine the molecular structure of proteins and use the computer to explore the relationship of the molecules that compose them.

Health Care: In hospitals, computers are used to keep an integrated computerised patient records and to maintain computerised stock control system to keep records of supplies and ensure that stocks are kept at adequate levels. They are exhaustively applied in diagnostics, analytical work,and also in the management of health services.

Library : The current applications of computers in libraries can be two fold : House keeping and Information retrieval. The house keeping activities include acquisitions control, serials control, cataloguing, and circulations control operations. The information retrieval activities include storage of bibliographic information that need to be processed, searched, retrieved and disseminated to users upon demand.

Other: Computers are essential to the agricultural sector to store and retrieve agricultural information (develop agricultural databases), to the industrial sector for different activities, such as quality control and computer assisted maintenance. Police agencies use computers to track criminals and run license check on vehicles.

To be able to take advantage of the many emerging information technologies and their applications, education, training and research is necessary so as to produce personnel

capable of handling and managing information systems for the benefit of Ethiopian society.

This study is specific to examining the current level of application of computers in Education and Research in institution of higher learning in Ethiopia. It will also examine the courses relating to computers offered in these institutions.

2.3 CURRENT PRACTICE IN SUB - SAHARAN AFRICA

In order to examine the current practice in Sub Saharan Africa, Some related research reports on computer developments in the region have been reviewed.

2.3.1 Ethiopia

Regarding computer development in Ethiopia, Sirak said, in his research entitled "Survey of the Development of Computer use in Ethiopia", that 'Automation in general was a new phenomenon to the large majority of the public organizations' (Sirak,1988)

Sirak's paper was generally based on a survey that was still in progress when the survey results were published. The survey attempted to identify the earliest computer users and

five government organizations were selected to record their experiences in computerization.

The report generally discussed the introduction and development of IBM, NCR, BURCO, and SERIC in Ethiopia. The training given by each organization and the maintenance services are also discussed. It also tried to cover some of the major computer suppliers and their contribution to the development and awareness of mechanization in Ethiopia, and discussed in detail the introduction and development of computer application in the Central Statistical Authority, Ethiopian Electric Light and Power Authority, Ethiopian Air Lines and Ministry of Finance.

The findings of the survey showed that computer centres had gone through the earliest level of technology.

> " Most organizations installed computer systems within the last ten years. More users are expected to employ the services of computers as hardware costs are becoming less expensive. Educational institutions have also introduced courses on computers and the level of awareness about computers will be increased."
> (Sirak,1988)

Although computer developments were surveyed in different organizations, the report did not consider the higher learning institutions in Ethiopia.

Another study (Anable, 1985) considered automation of the Addis Ababa University Library. The report discussed mainly the major approaches to employing automation within a library and identified the local factors which would have an impact on the basic decisions regarding automation.

The paper described the rationale for automation such as cost benefits, improved services or products, increased capacity requirements, and easier external communications.

The need for trained personnel, the software development tools and the hardware were considered in relation to selecting an appropriate system. The analysis of the existing system of activities in Addis Ababa University Library was done department by department, and a plan for automation was provided.

Although the report is mainly related to the Addis Ababa University Library system, it could form a basis for automation of Libraries in other higher learning institutions and research centres.

Another report, (Seetharaman, 1987), prepared with the objective of formulating a plan for the establishment of a National Scientific and Technological Information and Documentation Centre in Addis Ababa, indicated that the provision of library and information facilities in science and technology will be one of the many critical requirements for accelerating the progress of research and development efforts in the country. According to the survey, the existing library and information facilities in the country are inadequate in many respects.

The report described the development of research and development activities in the country beginning with the establishment of Addis Ababa University and some other research institutions in the early 60's. The initiative came from a number of expatriates working in various faculties in the University.

The evaluation studies (Seetharaman,1987) indicated that the then existing situation in the country with regard to provision of library and information facilities for the public, for academic studies, and for research and development activities in science and technology were not wholly adequate, when judged by the standards of some other developing countries, in relation to the area and population of Ethiopia and the developments taking place in the field of education.

Although most of the evaluation and recommendations are related to libraries, it was recommended that in general :

- the government may allocate necessary funds for the establishment of NSTIDC (National Scientific and Technological Information and Documentation Centre) and provide it with all necessary facilities such as buildings, manpower, equipment, etc.., required for its successful growth and development;

- the government may approve the recruitment of qualified and experienced personnel required for the centre and arrange for their training;

- the government of Ethiopia may also explore possibilities of seeking international assistance for the centre to meet the foreign exchange costs;

Generally, the report emphasised on establishment of libraries with computer facilities and the plan was quite detailed.

As Libraries form the basis for research and other related activities in higher learning institutions, the above

studies are relevant to the present research. If addis Ababa University Libraries are automated as planned (Anable,1985), they might form an inter-library computer-based information exchange to support the research and teaching activities.

2.3.2 Other Sub Saharan African Countries

PADIS surveyed the use of micro-computers in documentation and information centres in Africa (PADIS,1988).

The survey covered the documentation activities, user services, document collections, professional staff, the types of computer used, number of micro computers each institution had, the software used and the problems encountered in the use of micro computers.

The findings based on responses from 65 institutions, were summarized as follows :-

. specialized software package for bibliographical database management are not systematically used in documentation and information units, in spite of the power, efficiency and availability, free of charge, of tools, such as, UNESCO's mini-micro CDS/ISIS;

It was found that almost all of the answers to the questions differed from the ones given in 1988. The availability of computers increased to 75% as compared to 58% in the 1988 survey. The utilization of the available computers also increased from 66% to 86%. As the computer facility increased more than two-thirds of the institutions reported **shortage of trained staff as compared to 50% in 1988.**

The frequency of training of personnel had also increased. Nearly fifty percent of the centres were sending **their staff abroad for training, showing an increase of more than 14% over the 1988 data.**

The survey report concluded that:

- The fact that the greatest percentage increase was in requests for installation of PADIS data bases, shows the growing awareness of the need for computerized resources to satisfy the information needs of their users.

- Computerization is not without its problems, one particular problem being the reported unavailability or inadequacy of local training facilities.

In a series of papers, Computers and the Third world Today, (Courier, 1989) we looked at the present situation in the developing countries including Africa and the various strategies they have adopted, and outlined trends in international cooperation.

In discussing the years 1960 - 1980, the paper declared that "Informatisation in developing countries has its specificity, since common features of the process are found, to varying degrees everywhere.".

A look at the past showed that in many cases, it is an isolated initiative by the administrative authorities which has been behind the introduction of computers, rather than any predefined strategy. The failure to investigate needs before buying equipment and shortage of competent staff have led institutions to depend on the sellers for the necessary advice. Application has often been designed to using what was available rather than obtaining what the country needs. Under-utilization of facilities was the obvious outcome of their unsuitability and poor after-sales services for maintaining the hardware. The scattered ill-assorted nature of the facilities have also prevented the investments from having the desired effect.

The unsuitability and under-utilization of facilities have also been deplored, resulting in technological dependence of the third world. The article summed up the discussion of the past as follows:

> " The developing countries use techniques which the industrialised countries have devised in response to specific needs of their own. Unless these techniques are adapted or innovations made by the third world users, then the phenomenon of dependence is perpetuated."

The case of Ethiopia is the same. The problem exists without any solution being suggested. Therefore, the present work relating to higher learning institutions may recommend some solutions for the problem of shortage of staff, software use and hardware maintenance and in general for the proper utilization of computers.

"Computers and telecoms in Africa" an article in Computers in Africa (Oct,1989) reviewed the achievements in developing Africa's telecommunications infrastructure and found that although the gap between Africa and the industrialized countries is wide, the continent could leapfrog during the 1990's by utilising computer-linked technologies.

It stated that "Africa is by far the most underdeveloped continent for telecommunication". According to figures compiled, the number of telephone lines in Africa had reached just over 3.2 million in 1986, an average of 1.6 lines per hundred people and only 0.9% of the world total.

The report also suggested some possible solutions and stated that "To overcome this poor base, there is a clear commitment on the part of the multilateral institutions such as the world bank to improve the continent's telecommunications infrastructure, using the latest technology".

The paper concluded that "The technology of the new telecommunication era relies heavily on earlier developments in the computer field. Computer equipment is an integral part of digital telecommunication facilities".

Mwara (1986) examined computers and development in Kenya. The objective of the study was to examine the implications of manpower, education, training, and information technology policy. It also discussed how data processing activities began in Kenya and their developments with the establishment of major manufacturers such as NCR and IBM. (Mwara, 1986). He noted that :

" one of the biggest dangers facing developing countries is probably technological isolation from the rest of the world. If isolation persists and the gap widens then there is every possibility that these countries will remain 'developing' and possibly slide down the scale to 'fourth world' category.".

The methodologies used in the survey were interviews and studying existing documents on computer development in Kenya.

The study had a number of valuable results. The analysis of the general hardware in Kenya indicated that in 1981 there were 127 computer mainframes and the number was estimated to grow at 28% annually. It was also reported that a variety of programming languages were being used in Kenya, including ALGOL, BASIC, COBOL, and FORTRAN.

The study examined the extent of use of computers and the hours of work done per day. The latter varied from one installation to another indicating under-utilization of the new technology in Kenya to the extent of about 6600 hours per week.

The manpower utilization data for 1982 indicated that there were about 2018 data processing professionals, with a

32% increase over the 1979 data. The report also indicated that some institutions provided training in computer applications.

The conclusions mainly focused on manpower training in Kenya, stating that

> " The problems of manpower instability whether as a result of brain drain or some other factors can be resolved through a variety of means, like improving the working conditions of the staff, by promotions and other related activities. Training and education for professional and personal development must be encouraged and provided to personnel. Lack of it will result in professional decay, demoralization and inefficiency." (Mwara,1986).

Scott (1979) discussed the merging of information processing with telecommunications with particular reference to Zambia and Kenya.

The paper indicated that the amount of computing varies from one African country to another. It stressed that, at that time (1979), there were 60 mainframes to approximately 16 million Kenyans, there were 20 mainframes to approximately 5 million Zambians and less than 10 to approximately 12 million Tanzanians.

In discussing the implications of technology on the economics of Africa, taking Kenya as an example, Scott stated that :

> " The University, through its Institute of Computer Science or Computer Centre has an obligation to give **a lead in the provision of education at all levels in** society to enable the impact of the development of the new computer technology to be fully understood and intelligibly discussed".

The paper recommended that there should be a central pool of expertise to coordinate, provide consultancy and training on all aspects of computer applications within each country in **Africa. Such a centre should be closely associated with a** University in the country and could be known as the National Computing Centre.

The above reports tried to cover the problems involved in computer use and we find that the conclusions and recommendations given are similar in all the reports.

Although the potential for application exists in higher education, the prevailing problems in other developing countries also applies to Ethiopia.

CHAPTER THREE

HIGHER EDUCATION IN ETHIOPIA

3.1 BACKGROUND

The establishment of the University College at Addis Ababa in 1950 marked the beginning of modern higher education in Ethiopia. Within the next ten years the College of Agriculture in Alemaya, the College of Engineering in Addis Ababa, The Institute of Building Technology and the Gondar Public Health College were opened.

These higher learning institutions were administered under various government agencies or Ministries. The Ministry of Agriculture oversaw the Alemaya Agricultural College; the Ministry of Education supervised the college of Engineering And Building College; and the Ministry of Public Health controlled the Gondar Public Health college. All these colleges were mutually independent without any working relationships at all. Each had its own policies of admission, promotion, graduation and other activities.

Later in February 1961, a charter brought all these together into the then Haile Selassie I University, and in its inauguration, the former palace grounds became the main campus of the new University. Following the inauguration, the

Faculty of Education, the School of Social work, the College of Business Administration, the Law School and the Faculty of Medicine were established in the year 1962-63.

After the revolution in 1974, the Haile Selassie I University was named Addis Ababa University. New Colleges and Faculties were opened and existing ones expanded. The Bahrdar Teacher's College, the Agricultural Junior Colleges at Awassa and Debrezeit, the Faculty of Veterinary Medicine in Debrezeit were opened. The Medical Faculty in Addis Ababa was expanded and the Gondar Public Health College was raised to a six year college of medical sciences. Ever since, the University has been functioning with the following objectives:

- advance science and technology
- impart knowledge by teaching
- advance knowledge through research
- study, preserve and develop the Ethiopian cultural heritage.
- satisfy the manpower needs of Ethiopia.

In 1977, the Commission for Higher Education was established to plan and coordinate all the programmes of institutions of higher education. Later in 1987, the duties and responsibilities of the Commission were transferred to the Ministry of Education of Ethiopia with the establishment of

Higher Education Main Department (HEMD) under the Ministry and headed by a vice minister. It was mainly charged with the responsibility of coordinating higher education in the country.

The College of Urban Planning under the administration of the Ministry of Urban Development and Housing, Wondo Genet College of Forestry under the Ministry of Agriculture, the Jimma Institute of Health Sciences under the Ministry of Health and the Arba Minch Water Technology under Water Resources Development Commission were added to the family of institutions of higher education since 1978.

The various higher learning institutions operating under the HEMD and their location are presented in the following table and map.

3.2 INSTITUTIONS UNDER HEMD

3.2.1 AAU

TABLE 1 : INSTITUTIONS UNDER AAU

Faculty/School/Inst.	Location	PROGRAMS OF STUDY
Faculty of Business & Economics	**FBE Campus near main Campus**	**BA in accounting** **MA in Economics** **M.Sc in Economics Devt. & Planning** **BA in Management & public ad.**
College of Social science	Main campus	BA in Sociology BA,MA in Geography BA,MA in History BA in Philosophy BA in Political Sciences & Int. Relation
Demographic Training & Research centre	Main campus	M.Sc in Demography
Institute of Language studies	Main campus	BA in Foreign Language & Lit. BA in Eth. Lang. & Literature BA in Linguistics BA in Theatre Arts MA in Literature
Faculty of Education	Main campus	BA, MA in Educational psychology Diploma, BA, MA in Ed. Administration Diploma in Technical Teacher Educatio
The Library Science Department	Main campus	Diploma,BLs in Library Science
Faculty of Law	Main campus	LL.B in Law
School of Information Studies for Africa	Main campus	M.Sc in information Science
School of Pharmacy	Same Building as school of Graduate studies (5 kilo campus)	B.Sc in Pharmacy

contd .....

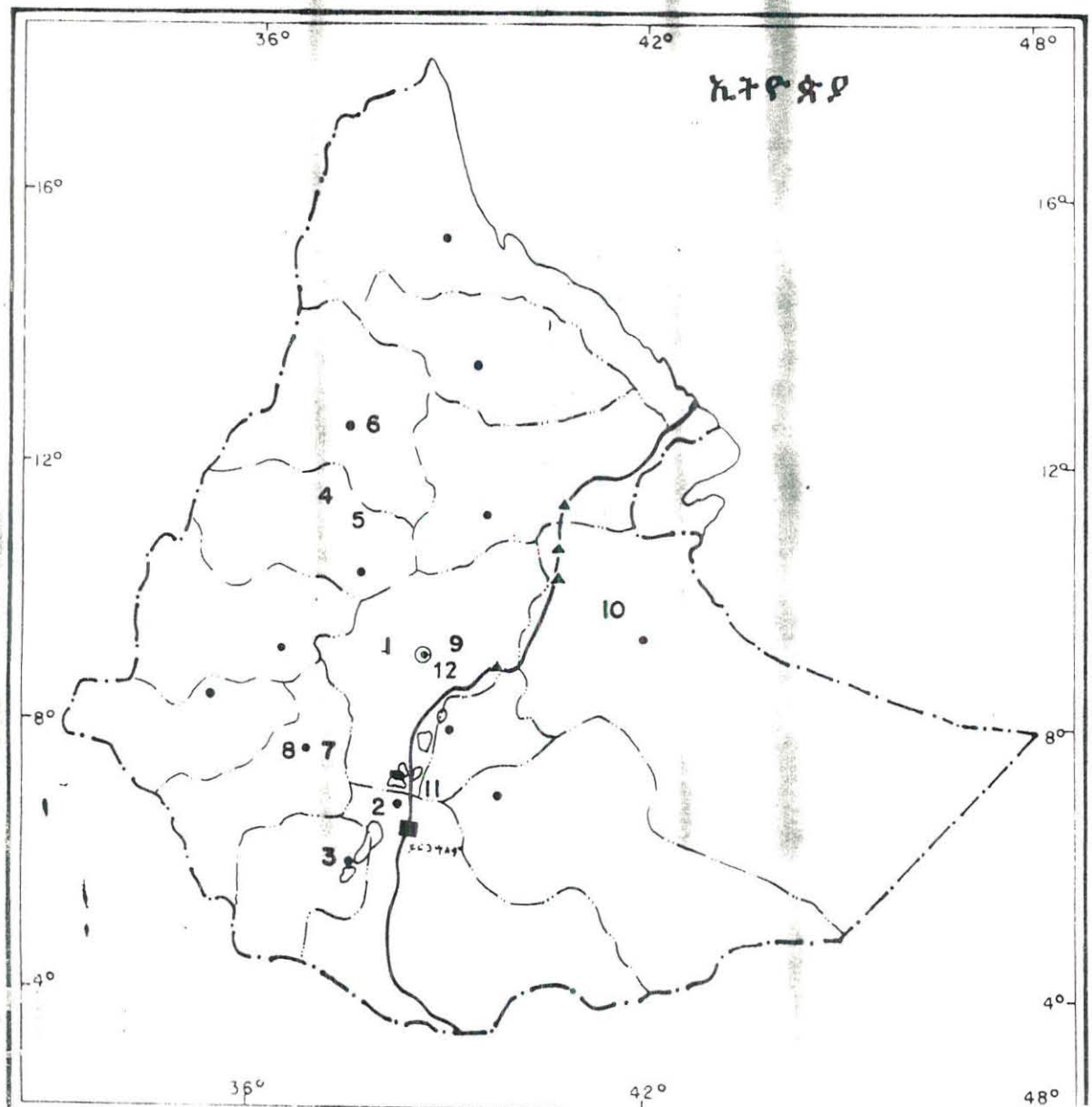
Faculty of Technology (Northern Campus)	5 kilo campus	B.Sc of Civil Engineering B.Sc in Electrical Engineering B.Sc in Chemical Engineering B.Sc in Mechanical Engineering
Faculty of Technology (Southern Campus)	6 Km distance from the main campus	B.Sc in Architecture and Town planning Advanced Diploma in Building Technology
Faculty of Science	1 Km distance from the main campus	B.Sc in Biology B.Sc in Chemistry B.Sc in Geology B.Sc in Mathematics B.Sc in Physics B.Sc in Statistics
The Faculty of Medicine	in Main premises of Black Lion Hospital	Doctor of Medicine Degree MSc in Anatomy MSc. in Community Health CS. in Internal Medicine CS. in Obstetrics and Gynaecology CS. in Paediatrics and Child care CS. in Pathology CS. in Ophthalmology
Awassa Junior College of Agriculture	Sidamo Administrative Region (275km South of Addis Ababa	Diploma in Animal Science & Technology Diploma in Home Science & Technology Diploma in Plant Science & Technology Diploma in Agricultural Engineering and Technology
Bahr Dar Teacher's College	Gojjam Administrative Region (570km North West of Addis Ababa)	BE Pedagogical Sciences Diploma in English Diploma in Amharic Diploma in Biology Diploma in Chemistry Diploma in Physics Diploma in Mathematics Diploma in Adult education Diploma in Geography Diploma in History
Gondar College of Medical Sciences	Gondar Administrative Region (738km North of Addis Ababa)	Doctor of Medicine Degree
Debrezeit Faculty of Veterinary Medicine	Debrezeit (45 km South east of Addis ababa	Doctor of Veterinary Medicine Degree

1.2.2 Others

TABLE 2 : OTHER INSTITUTIONS UNDER HEMD

College of Commerce	5km distance from the main campus	Diploma in Accounting Diploma in Secretarial Sciences Diploma in Marketing Diploma in Supplies Diploma in Banking Diploma in Financial Marketing
Kotebe College of Teachers' Education	10.4km from 4 kilo campus	Diploma in Teaching Profession
Ambo College of Agriculture	Shoa Administrative Region (125km West of Addis Ababa)	Diploma in Agricultural Engineering & Technc Diploma in Animal Science and Technology Diploma in Home Science and Technology
Jimma College of Agriculture	Keffa Administrative Region (346km South West of Addis Ababa)	Diploma in Agricultural Engineering & Technc Diploma in Animal Science and Technology Diploma in Home Science and Technology
Bahr Dar Polythecnic Institute	Gojjam Administrative Region (565km North West of Addis Ababa)	Adv. Diploma in Agromechanics Adv. Diploma in Industrial Chemistry Adv. Diploma in Electrical Technology Adv. Diploma in Wood Technology Adv. Diploma in Textile Technology Adv. Diploma in Metal Technology
The Alemaya University of Agriculture	About 507 km South East of Addis Ababa	BSc, MSc in Agricultural Economics BSc in Agricultural Engineering BSc, MSc in Animal Science BSc in Forestry BSc, MSc in Plant Science

LOCATION OF HIGHER LEARNING INSTITUTIONS IN ETHIOPIA



LEGEND

1. Ambo Agricultural College
2. Awasa Agricultural College
3. Arbaminch Water Tech.
4. Bahir Dar Polytechnic
5. Bahir Dar Pedagogy
6. Gondar Medical college
7. Jimma Agricultural College
8. Jimma Health Sciences
9. Addis Ababa University
10. Alemaya University
11. Wondo Genet College of Forestry

3.3 COMPUTER TECHNOLOGY EXPERIENCE

As elsewhere, higher learning institutions in Ethiopia are considered to be the primary source of intellectuals and professionals. Such human resources help in building the country's economy and making plans and projects for the social welfare of citizens. Thus, information technology opens the way for them to share views, information and experience.

Despite the versatility of computers in modern education, they are not adequately utilized in educational systems in Ethiopia. Some institutions have a well equipped computer laboratory where staff can have access for preparing teaching material and doing research, while some do not have any computer facility. Some departments give adequate courses on computers aided by computer laboratories, while some give introductory or no computer courses to students. We might as well state that the application of computer technology in higher education has been overlooked for reasons such as:

- Budget to buy the necessary hardware and software may not be available.
- The necessity to adopt the technology might not have been considered seriously.
- Trained staff for its proper handling might not be available.

CHAPTER FOUR

PROCEDURES AND METHODS

4.1. PROCEDURES

4.1.1 Preparation of Questionnaire

As there are a large number of departments associated with higher learning institutions, the questionnaire method was found suitable compared to other methods of data collection, such as, observation, interviews etc. The number of questions were too many to fit into interviews. Selected interviews were arranged on matters arising from questions in the questionnaire.

In any questionnaire-based survey, the questions should produce complete and valid information from each respondent. Since there are no simple rules for questionnaire construction, we started by looking at the general purposes that a questionnaire should serve. For instance, the questionnaire should:

(i) meet the objectives of the research

(ii) obtain the most complete and accurate information possible;

Taking this into consideration, the PADIS questionnaire prepared for their study "The Use Of Micro Computers In Documentation & Information Centres in Africa(1990)", was modified. A pilot survey was not necessary, for the results obtained by PADIS were reviewed and were found to have no shortcomings that could have possibly resulted from the design of the questionnaire. The questionnaire had two sections :

The first section seeks information on the name and address of the institution, the type and characteristics of the computer equipment available, the software used, professional manpower and any plans for further computerization, etc.

The second section is concerned only with institutions which have access to micro computers. It deals with types of computer applications, kinds of software used, user services provided using computers, equipment and personal problems encountered, policies followed for training and acquisition of equipment and kind of assistance that might be requested from any other centre or institution.

The modified questionnaire also has been organized and re-worded, as much as possible, to encourage respondents to provide accurate and complete information. Interviews and site visits were also undertaken in each institution in order

to clarify some points in the questionnaire.

4.1.2 The Population

The study was based on complete enumeration (i.e, taking each and every higher learning institution in Ethiopia). A total of 58 institutions and departments were taken as the study population. These were grouped into the following categories:

- Higher learning institutions under A.A.U in Addis Ababa.
- Higher learning institutions under A.A.U located outside Addis Ababa.
- Higher learning institutions strictly under Higher Education Main Department.
- Higher learning institutions under Ministries

Before questionnaires were distributed, a site visit and observation of the institutions indicated that almost all departments under A.A.U located in Addis Ababa function independently in acquiring computers and using them, whereas in other higher learning institutions outside Addis, either

there is a computer section or there is no computer facility. Therefore, the questionnaire was distributed in two stages :

In the 1st case questionnaires were distributed department by department within each faculty under A.A.U.

In the 2nd, 3rd and 4th cases, just one questionnaire was given to each institution to be filled out by the Dean or Head of Computer section.

4.1.3 Data Collection and Sources

As is well known, the quality of the research can be no better than the quality of the data collected. Therefore we **have tried to collect the best possible accurate data with a** close follow up when questionnaires were filled out.

The data were collected from January 24, 1992 to March 30, 1992. There were some unwilling respondents, especially in A.A.U, who did not want either to be interviewed or fill out the questionnaire. However, those departments have no computer facility, or no collection. Therefore, it was just a matter of adding them in the data collected with those

institutions with no computer facility. There has also been no response from the Faculty of Medicine which comprised about fourteen departments.

The location of some of the higher learning institutions has also been a problem for the road transport was unsafe, and we had to book for a ticket and wait for about two weeks, which delayed the collection of the questionnaire.

The respondents who filled out the questionnaire were mainly :

- Deans of institutions
- Heads of departments
- Heads of computer section

The first two provided the general information about the department they belong, on the policies followed regarding acquisition of computers, and also on the number of professional staff available in the department.

Heads of computer section provided information on the type of computer available and the kind of software used, and other information specifically related to the computers available.

Apart from the questionnaire, the libraries of each institution were visited, and interviews were arranged whenever necessary to clarify some points. The available documents about each institution were also studied.

4.2.METHODS OF ANALYSIS

The data collected was processed and analyzed using the SPSS package available in the SISA Computer Laboratory.

CHAPTER FIVE

FINDINGS AND DISCUSSION

This chapter discusses the results obtained by the survey. The results are based on analysis of questionnaires completed by 39 institutions out of the 58 questionnaires distributed, amounting to 67.2% response. A total of 49 computers were found in the 28 institutons with computer facilities.

5.1 STATUS OF COMPUTER USE

5.1.1 Facilities

As analyzed from the questionnaires returned, more than half of the institutions have computer facilities. The following frequency table illustrates the computer facility.

TABLE 3 : COMPUTER FACILITY

COMPUTERIZATION	# OF INSTITUTIONS	PERCENTAGE
COMPUTER FACILITY	28	71.7%
NO COMPUTER FACILITY	11	28.3%
TOTAL	39	100%

The 28 institutions having computer facilities also answered questions on the location of the computers. The data is summarized in the following frequency table.

TABLE 4 : LOCATION OF COMPUTERS

LOCATION	# OF INSTITUTIONS
WITHIN LIBRARY	0
WITHIN COMPUTER SECTION	25
SHARED WITH ANOTHER INSTITUTION	2
PRIVATELY OWNED	7

It should be noted that, institutions may have more than one computer where some of them are located in the computer section, while others are privately owned, resulting in a double count with location of computers when the frequency table was constructed.

These institutions were asked as to how the computers were acquired. The data is presented in the following table.

TABLE 5 : MODE OF ACQUISITION OF COMPUTERS

MODE OF ACQUISITION	# OF INSTITUTIONS
GIFT	17
PURCHASE	13

Again here, the total does not add up to 28 since there is a double count. In case of more than one computer, one may be a gift and the other(s) purchased.

5.1.2 Types of Computers Available

5.1.2.1 Models of Microcomputer available

The following frequency table was summrized according to the type of micro computer the institutions indicated.

TABLE 6 : MAKE/MODEL OF MICROCOMPUTER

MAKE/MODEL OF MICROCOMPUTER	# of institutions
TOG	1
EPSON	2
HP FAMILY	13
NCR	3
SHARP	1
TOSHIBA	2
WANG	1
ZENITH	3
MACINTOSH	2
AMSTRAD FAMILY	4
IBM FAMILY	13
TANDON 286	1
TANDON 386	1

since an institution may have more than one type of micro computer, this resulted in a double count. As of the other types of computers, only the Mathematics Department has mainframe and minicomputers.

Regarding operating systems, most of the institutions use DOS in various versions, the most common one being DOS version 4.1. SISA, apart from using DOS has network facility which operates with Novell Netware.

5.1.2.2 Memory Capacity

The capacity of the main memory (RAM) of the available micro computer was also indicated and the findings are summarized in the following frequency table.

TABLE 7 : MEMORY CAPACITY (RAM)

MEMORY CAPACITY	# OF COMPUTERS
128 KB	**2**
256 KB	1
512 KB	6
640 KB	21
1024 KB	8
ABOVE 1 MB	11
Total	49

The following frequency table also summarizes data about the capacity of the hard disk.

TABLE 8 : HARD DISK CAPACITY

HARD DISK CAPACITY	# OF COMPUTERS
NO HARD DISK	5
20 MB - <=40 MB	28
40 MB - <=60 MB	5
60 MB - <=80 MB	6
80 MB - <=100 MB	2
100 MB - <=120 MB	**3**
Total	49

5.1.3 Utilization of Computers

We tried to see whether the available facility is used or not. The findings are summarized in the following frequency table.

TABLE 9 : COMPUTER UTILIZATION/USE

COMPUTER UTILIZATION	# OF INSTITUTIONS	PERCENTAGE
UTILIZED	27	96.6%
NOT UTILIZED	1	3.4%
Total	28	100%

The institution which indicated that the computers were not utilized was the Pharmacy School. The reason is that the computer has been recently acquired and not installed yet.

5.1.3.1 Purpose of Utilization

Of the 27 institutions, which indicated that the computers are utilized, 2 institutions indicated that they use the computers for bibliographic activities, 23 for word processing, 4 for financial applications, 18 for statistical applications and 13 for other purposes, such as to write programs, for introduction of computer courses, and so on.

5.1.3.2 Software Available

Use of various types of software was indicated by those institutions which already have installed computers, as shown in the following table :

TABLE 10 : SOFTWARE USED

SOFTWARE USED	# of institutions
dBASE III/IV	16
CDS/ISIS	3
MINISIS	1
STATISTICAL PACKAGE	16
LOTUS	11
WORD PROCESSING	26
ELECTRONIC MAIL	1
OTHER SOFTWARE	8

Since an institution might have more than one type of software, the total does not add up to 28.

5.1.4 Reproduction Equipment

On the availability of peripherals linked to microcomputers and other reproduction equipment, data is summarized in the following frequency table.

TABLE 11 : REPRODUCTION EQUIPMENT

EQUIPMENT	# of institutions
OFFSET PRINTER	2
LASER PRINTER	9
DOT MATRIX PRINTER	31
PHOTOCOPY MACHINE	25
FAX MACHINE	4

5.1.5 Extent of Utilization

5.1.5.1 Number of hours of computer utilization

The hours of computer utilization per day ranged from 2 hrs to 10 hrs. The following frequency table summarizes the findings.

TABLE 12 : HOURS OF COMPUTER UTILIZATION PER DAY

HOURS	# OF INSTITUTIONS
0 - 3	5
4 - 7	11
8 - 11	10
12 - 15	2
Total	**28**

From the above table the mean hours of computer utilization is found to be 6.7 hrs per day.

5.1.5.2 User Services Provided

The services provided using computers were categorized into two groups : user services and dedicated only for office use. The findings are presented in the following tables.

TABLE 13 (a) : USER SERVICES PROVIDED

SERVICES	# OF INSTITUTIONS
CURRENT AWARENESS LISTS	0
BIBLIOGRAPHIC SERVICE	1
QUESTION/ANSWER SERVICE	0
ONLINE SEARCHES	0
STATISTICAL ANALYSIS	19
OTHER SERVICES	9

Other uses indicated were for office uses only, and the results are summarized as follows :

TABLE 13 (b) : OFFICE USE

OFFICE USE	# of institutions
STATISTICAL ANALYSIS	19
WORD PROCESSING	23
OTHER	4

Regarding the form of computer generated services, most of the institutions indicated computer print outs and on diskettes. In the case of electronic mail, the only institution that has the facility is School of Information Studies for Africa (SISA) which is equipped with modern computer facilities, and other organizations like ILCA and PADIS.

5.1.6 Manpower Availability

5.1.6.1 Staffing

The data on the total number of professional staff per institution/ department is presented in the following table :

TABLE 14 : NO. OF PROFESSIONAL STAFF

NO OF PROF. STAFF	# of institutions
1 - 10	1
11 - 20	8
21 - 30	16
31 - 40	3
41 - 50	3
51 - 60	4
over 60	4
Total	39

Among these professionals we also tried to examine whether there are any computer related professionals.There are one information systems specialist, 7 software specialists, 4 hardware specialists, 3 telecommunication specialists and 14 other computer related professionals.

5.1.6.2 Training

Very few institutions have staff members trained abroad in computer use and related subjects; most were self trained locally as the following frequency table illustrates :

TABLE 15 : TRAINING OF STAFF

TRAINING	# of institutions
ABROAD FOR LONG TERM	4
ABROAD FOR SHORT TERM	4
LOCALLY AT DEALER'S SITE	0
SELF TRAINED LOCALLY	20
ON THE JOB TRAINING	8
OTHER TYPE OF TRAINING	7

The total does not add up to 28 since an instituion might have staff where some are trained for long term and some for short term.

5.1.7 Problems in computer use

Respondents were asked whether or not they encounter problems in the use of computers. Out of the 24 institutions who responded in the affirmative, the following problems were indicated.

5.1.7.1 Equipment Problem

Among the different problems encountered regarding the hardware and the software used, the response from the survey is illustrated in the table below.

TABLE 16 : HARDWARE AND SOFTWARE PROBLEM

PROBLEM	# of institutions
UNAVAILABILITY OF SPARE PARTS	13
UNSATISFACTORY DOMESTIC MAINTENANCE	9
ENVIRONMENTAL CONDITIONS (DUST, HUMIDITY, ETC..)	2
SLOW PROCESSING SPEED	5
INADEQUATE COMPUTER MEMORY	11
LACK OF PROPER SOFTWARE DOCUMENTATION	8
INADEQUACY OF PERIPHERALS	9

The same case in double counting applies here for an insitution may have more than one problem.

5.1.7.2 Personnel Problem

On the subject of personnel problem, most of the respondents indicated both lack of training in software use and shortage of trained staff, as indicated in the following table.

TABLE 17 : PERSONNEL PROBLEM

PROBLEM	# of institutions
SHORTAGE OF TRAINED STAFF	13
LACK OF TRAINING IN SOFTWARE USE	20

5.1.8 Maintenance Services

There was also a question regarding maintenance service The results are summarized in the following table.

TABLE 18 : MAINTENANCE SERVICES

MAINTENANCE	# OF INSTITUTIONS
USE LOCAL SERVICE	16
USE BACKUP SYSTEM	3
SHIP WHOLE SYSTEM ABROAD	3

Six institutions indicated that they have not encountered the problem so far.

In the case of maintenance service where the whole system is shipped abroad, there is already one institution (Jimma Institute of Health Sciences) which has sent the whole system to Canada for maintenance.

5.1.9 Efficiency

The respondents were also asked whether the work of the institution has become more efficient since the introduction of computers. Out of the 28 institutions who already have

computer facilities, 18 answered YES. They indicated that the quality of work has become better and research work is facilitated , from the view point of data analysis and word processing which might otherwise have to be done manually.

5.2 FUTURE PLANS

Institutions who did not install computers were asked if they had any plans to do so in the future. If so, the intended date of acquisition and the types of computers were indicated. The data from the 16 institutions who do not have computer facilities, is summarized in the following table.

TABLE 19(a) : PLANNED DATE OF ACQUISITION

PLANNED DATE	# OF INSTITUTIONS	PERCENTAGE
IN 1991 - 1995	4	36.4%
1995 -	1	9.1%
PLANNED BUT NO DEFINITE DATE	6	55.5%
Total	11	100 %

TABLE 19(b) : TYPE OF COMPUTER PLANNED

TYPE OF COMPUTER PLANNED	#OF INSTITUTIONS
MAIN FRAME COMPUTER	0
MINI COMPUTER	0
MICROCOMPUTER	9
NOT STATED	2
TOTAL	11

In the case of the assistance required from other organizations in the computerization of the institution's work, only those institutions with computer facilities answered the question. The results obtained are summarized in the following table:

TABLE 20 : ASSISTANCE NEEDED FROM OTHER INSTITUTIONS

ASSISTANCE REQUIRED	# OF INSTITUTIONS
TRAINING IN SOFTWARE PACKAGE	19
DATABASE SHARING	11

The institutions, which indicated that they needed database sharing, were also asked if they can state with whom. Most of them indicated the ones which deal with related subjects, (For example. Pharmacy School indicated database

sharing with Medical faculty, Bahrdar Poly Technic Institute and Arba Minch Water Technology indicated database sharing with Technology Faculty in Addis Ababa, etc.).

5.3 DISCUSSION

Based on the findings of the survey we may conclude that the present state of use of computers in institutions of higher learning in Ethiopia is not satisfactory, i.e, computers are not utilized adequately, let alone the information to be effectively used in a coordinated and integrated manner.

The number of computers available are not adequate in **some institutions in relation to the purposes for which the** institutions intend to use them. One such example is the Faculty of Business and Economics. It has three departments : Accounting, Economics and Management. There is only one computer available in the Department of Economics which serves only the staff of the department. The other two departments which give computer courses to undergraduate students do not have any computer facility. Students are given theoretical courses on computers without providing for any practical/hands on work. The staff do not also have access to computers as there are no centrally located computers which staff members of the faculty can access.

The average number of hours of computer utilization is about 6.7 hours, indicating that they are under utilized. Although the working hour is taken to be eight hours per day, the academic staff do work beyond eight hours. The fact that they are utilized for 6.7 hours shows that either they are inaccessible or there is lack of training.

The inaccessibility of computers may be accounted for by the problem of management. As observed in some institutions, the computers are locked in somewhere, and only the staff permitted by the department head use the computer which might discourage others who want to make themselves familiar with computers.

Although the majority of the common software were said to be owned by the institutions, some software are never heard of, let alone utilized. This shows that institutions buy software along with the installation of computers. They do not make a follow up for any developed software, unless and otherwise a specific need arises. For example, The CDS/ISIS software used for many applications is given free of charge by UNESCO and training is free, and MINISIS, a generalized information storage and retrieval system software, is developed and disseminated by IDRC.

The lack of awareness of the ready to use software, other than the ones already installed, have led institutions to overlook some important software packages. The software bought also lack proper documentation so that users are handicapped in the use of the software.

As observed in the survey, the existing manpower for proper handling of microcomputers is not commensurate even with the number of computers available, that is the ratio of trained manpower in computers to the total number of staff is very low.

The inadequacy of computer memory is a widely prevalent problem in the institutions. More than half (57.3%) have a hard disk capacity between 20 mb to 40 mb. Out of a total of 49 microcomputers, 10.2 % have indicated that their computers do not have a hard disk. The unavailability of spare parts is also one of the constraints. For example, in two of the institutions in A.A.U 'Technical Teacher's Education' and 'Awassa Agricultural College', computers were not operating just because of lack of spare parts. The interviewee said that they may have to be sent abroad, in which case, the transport cost may be more than the cost of a new computer. The unsatisfactory domestic maintenance service has kept the computers non operational for about a year now.

Most of the institutions go to the local service for maintenance but the majority also complained of unsatisfactory domestic maintenance. According to the survey we found only four people who might possibly have a limited theoretical knowledge in the subject with out no experience in maintenance.

The training aspect has also limitations. Most of the staff are self trained out of necessity to facilitate their own research work. The institution or the higher body does not appear to encourage training of staff even in short courses. Institutions in general, do not encourage scholarships for the staff for fear that they might defect, which has limited the number of computer professionals in the country.

The trained staff or training through institutions on how to use the software or the computers are seriously lacking which has resulted in the non use of software available even if the need arises. Most of the users learnt the software by themselves specific to their own need, and may not be in a position to help others. The obstacle to growth in the computer application is the limited expertise and experience.

Telecommunications network specialists are especially lacking, and hence the poor development of computer based information exchange between institutions.

Almost all of the institutions do not have any policy on the procurement of microcomputers or if they have, it is just that there is no budget or foreign exchange is limited which have adverse effects on purchase and repair of equipment. Most of the available computers are bought using a project fund or a gift from international organizations. Unless there is some policy or some higher body looking over the procurement of microcomputers, institutions who do not have relation with donor agencies might not have the chance to acquire computer facilities.

Resource sharing, in general, has been constrained by the absence of coordination and cooperation between institutions leading to under-utilization of available professional capacity. It is realized that there is a gap between what an institution can provide and what the staff and students seek.

Although a number of limitations and constraints have been seen, we also observed a promising future in computer applications in some of the institutions. School of Information Studies for Africa, Mathematics Department in AAU, Kotebe Teacher's Training, Demographic Centre and Technology

Faculty are equipped with relatively adequate number of computers for staffs and students to get acquainted with computers.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

The results obtained in this survey relate to new information technologies and tools at a relatively early stage in their development and application, especially with respect to Higher Learning institutions in Ethiopia. Although the survey has been carried out, in part, to ensure that the interests of the Higher Learning institutions in Ethiopia are taken into account at the early stages in technology development, clearly there are further investigations to be done. However, it is believed that basic information has been obtained that could form the basis for further research to establish a computer-based information exchange system between the institutions.

The following additional recommendations are offered based on the survey findings and problems observed.

Institutions should be encouraged to treat the acquisition of a computer and/or related items as an investment, supported by clear-cut definition of computer needs, and technical and economic evaluations.

Sharing of computer hardware, software and data resources should be promoted. Computer installations should be fully

utilized by permitting access to the facilities as many hours of the day as possible. Open access to staff, with proper security, such as, pass words, may hasten the development of experience with computers.

Some of the problems in software and hardware might have been caused because their suitability for the particular organization was not considered at the time when the computers were acquired specially if they were donated. The higher body should see to it that the computers are acquired and installed according to appropriate criteria and guidelines it may formulate. The general problems attendant to proper identification of equipment and software can be minimized by appropriate education and training in computer technology.

Promotion of computer education is of vital importance in order to overcome manpower problems. This may be undertaken by way of short course offerings in the institutions or continuing education programmes in selected centres both for training and retraining of personnel. Provision of scholarships and fellowships should be promoted for various types of training, including short and long term courses. There should also be on-the-job practical training of people in the various institutions.

Various consultancy services should be encouraged in order to enhance the skill of professionals in computer application. In addition to the already existing ones which give courses on computers, various training institutions with appropriate courses should be established under the Higher education.

Presently we find some institutions already equipped with the computer facilities to help solve the problem of unskilled manpower. These institutions include :

- The Mathematics Department of AAU offers an undergraduate degree with minor in computer sciences, and a two months programme on software engineering and the use of the software developed.

- The Technology Faculty of AAU offers computer courses for undergraduate students as well as staff on specified schedules.

- The National Computer Centre in the Science and Technology Commission provides training on software developments and use of software as well as on the job training.

- ILCA (International Livestock Centre for Africa) also gives training in the use of CDS/ISIS, MINISIS and other software, and also on the subject of information retrieval. The training is not only for staff members, but also to people working in centres which deal with livestock, agriculture, etc..

- PADIS offers training in the use of CDS/ISIS free of charge including the software itself.

If training of personnel in institutions abroad can not be afforded for short term and long term, these institutions might be consulted and arrangements made to give local courses covering 'Introduction to Computers' and the use of basic software.

For providing assistance required by other institutions, some measures should be taken to facilitate training in the use of various software packages and data base sharing through telecommunication networks.

While we dealt with individual departments and institutions and how they acquired and utilized computers, cooperation between the institutions could help in bringing information technology to bear on the problems cited. One

might consider the establishment of a higher body to promote cooperation in computer technology in institutions of higher learning in Ethiopia, whose functions may be mediating and catalyzing exchange of ideas and information among institutions within and outside the country. Moreover the body may have the following responsibilities :

- Systems Study : Assisting in a thorough pre-planning study of requirements of institutions' planning to acquire/apply computer systems even before acquisition of computers.

- Hardware and microelectronics development : Emphasise on optimal use of components, computer architecture and basic communications devices available.

- Training : Formulate a range of activities focused on skilled manpower development and promotion of computer literacy.

- Standard software development : Promote, assist and assign institutions/groups responsibility to adapt and/or develop various application software packages.

- Informatics policy formulation : Analysis, implementation and undertaking relevant comparative studies among institutions with a view to formulating informatics policy(ies) appropriate to the Ethiopian environment

- Promote and guide the development of computer related resources and their application in order to anticipate and meet the future needs of Higher Learning institutions.

- Study the existing legislations and regulating measures relating to import of information technology components and suggest ways and means of overcoming any constraints that these might be causing in the development of informatics and informatics industry in the country.

- Formation of a pool of expertise in information technology to assist institutions in computer maintenance, advice on hardware/software selection, etc.

External assistance might be useful in providing expertise, training, materials and equipment which might be coordinated by the higher body because of the shortage of budget and foreign exchange limitations prevailing in the country. Moreover there is need for awareness of political leaders and administrators about the role of information technology in society.

ANNEX I

ADDIS ABABA UNIVERSITY
SCHOOL OF INFORMATION STUDIES FOR AFRICA

This questionnaire is prepared to study the computer facilities and their utilization in institutions of higher learning in Ethiopia.

The questionnaire consists of two sections. The second section is to be filled out only if you have a microcomputer.

Your help in filling out the questionnaire will assist to carry out the study to the effect required, and discussions related to the questionnaire are highly welcome.

Please complete the questionnaire at your earliest convenience.

Thank you for your time and thoughtfulness in filling out this questionnaire.

5. If you have computer facilities, kindly describe them by filling in the chart(s) below.

a. Main frame computers

Make/Model	Operating system	Date acquired	disk units	
			Number	Capacity

b Minicomputers

Make/Model	Operating system	Date acquired	Disk units	
			Number	Capacity

c. Microcomputer

Make/ Model	Main Memory	Operating	Hard disk Capacity	No.
a.				
b.				
c.				
d.				

6. Does the institution/department utilize these computer facilities ?

[ ] Yes [ ] No

If yes,

a. For what purposes ?

[ ] Bibliographic / library data base management.

[ ] Word processing

[ ] Financial / management applications

[ ] Numerical / Statistical applications

[ ] Other, Please specify

- If you have on line access to remote databases, kindly fill in the following table.

Data Base	Type	subscription since when ?

b. What software do you use ?

[ ] dBASE III plus, dBASE IV

[ ] CDS/ISIS

[ ] MINISIS

[ ] Statistical Packages

[ ] Spreadsheet/accounting

[ ] Word Processing/Publishing

[ ] Electronic mail
[ ] Other (name) _____

7. How many hours on the average per day are these computers utilized ? _____

8. If your institution does not presently utilize computer technology, are there plans to do so in the near future ? (Check one)

[ ] In 1991 - 1995
[ ] 1995 -
[ ] Planned but no definite date

9. The institution is intending to introduce

[ ] Mainframe computer
[ ] Minicomputer
[ ] Microcomputer(s)
[ ] Other (Please describe) _____

10. What reproduction equipment does your institution have ?

[ ] Offset printer
[ ] Laser printer
[ ] Dot matrix printer
[ ] Photocopy machine
[ ] Fax machine

SECTION II

(To be completed only by institutions which presently have microcomputers)

1. For what purpose do you use microcomputers in your

[ ] Electronic mail

[ ] Other (name) _____

7. How many hours on the average per day are these computers utilized ? _____

8. If your institution does not presently utilize computer technology, are there plans to do so in the near future ? (Check one)

[ ] In 1991 - 1995

[ ] 1995 -

[ ] Planned but no definite date

9. The institution is intending to introduce

[ ] Mainframe computer

[ ] Minicomputer

[ ] Microcomputer(s)

[ ] Other (Please describe) _____

10. What reproduction equipment does your institution have ?

[ ] Offset printer

[ ] Laser printer

[ ] Dot matrix printer

[ ] Photocopy machine

[ ] Fax machine

SECTION II

(To be completed only by institutions which presently have microcomputers)

1. For what purpose do you use microcomputers in your

institution/department ?

[ ] User services

- [ ] Current awareness lists
- [ ] Bibliographies
- [ ] Question/Answer service
- [ ] **Online Searches**
- [ ] **Data analysis**
- [ ] Other

[ ] For office use only

- [ ] **Statistical analysis**
- [ ] **Word processing**
- [ ] Other, Please describe _____

_____

2. In what format do you provide computer generated **services to users ?**

[ ] Computer print outs
[ ] Diskettes
[ ] Electronic mail
[ ] SDI/ Current awareness
[ ] Magnetic tape
[ ] Others _____

3. Have you encountered problems in the use of microcomputers ?

[ ] Yes [ ] No

If yes, what kind of problem ?

a. Equipment problem

[ ] Lack of inadequacy of peripherals
[ ] Lack of or inappropriate software
[ ] Lack of software documentation
[ ] Inadequate computer memory
[ ] Slow Processing speed
[ ] Environmental conditions (humidity, dust, etc,)
[ ] Unavailability of spare parts
[ ] Unsatisfactory domestic maintenance

b. <u>Personnel problem</u>

[ ] Shortage of trained staff
[ ] Lack of available training for staff in software and hardware use.

4. Does your institution/parent organization/ have any policy governing to procurement of microcomputers?

[ ] Yes [ ] No

If yes, do these policies include any of the following elements ?

[ ] No budget available to purchase.
[ ] No restrictions on purchase.
[ ] Purchase restricted to companies with local representation.
[ ] Purchase restricted to companies which accept local currency.
[ ] A separate budget is allocated to computer. purchase, hardware and software maintenance.
[ ] Follow same policy like other institutions under the parent organization.
[ ] Follow institution's private policy

5. How were staff trained in the use of microcomputers?

[ ] Sent abroad for long term
[ ] Sent abroad for short term
[ ] Self trained locally
[ ] On-the job-training
[ ] Other (please specify) _____

6. What do you do when maintenance for computers is needed ?

[ ] Use local service
[ ] Use backup system
[ ] Ship whole system abroad for repair

7. Do you feel that the work of your institution has become more efficient since the introduction of computers ?

[ ] Yes [ ] No

if yes, in what ways ?

_____

_____

_____

8. In computerization of your information system, what assistance might you request from other institutions ?

[ ] Training in software packages
[ ] Data base sharing with _____

_____

9. Do you have any data base sharing through telecommunication networks ?

[ ] Yes [ ] No

if yes, with which institution ?

_____

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ANNEX II

LIST OF INSTITUTIONS VISITED

1. Business Education Dept.
   Faculty of Education
   A.A.U (Main campus)

2. Curriculum & Instruction
   Faculty of Education
   A.A.U (Main campus)

3. Educational Administration
   Faculty of Education
   A.A.U (Main campus)

4. Educational Psychology
   Faculty of Education
   A.A.U (Main campus)

5. Technical Teachers Education
   Faculty of Education
   A.A.U (Main campus)

6. Accounting Department
   Faculty of Business & Econ.
   A.A.U (FBE Campus).

7. Economics Department
   Faculty of Business & Econ.
   A.A.U (FBE Campus).

8. Management Department
   Faculty of Business & Econ.
   A.A.U (FBE Campus).

9. Ethiopian Lang. & Literature
   Institute of Lang. Studies
   A.A.U (Main campus)

10. Foreign Lang. & Literature
    Institute of Lang. Studies
    A.A.U (Main campus)

11. Linguistics
    Institute of Lang.Studies
    A.A.U (Main campus)

12. Theatre Arts
    Institute of Lang. Studies
    A.A.U (Main campus)

contd....

13. Law Faculty
Faculty of Law
A.A.U (Main Campus)

14. Biology Department
Faculty of Science
A.A.U (Arat kilo campus)

15. Chemistry Department
Faculty of Science
A.A.U (Arat kilo campus)

16. Geology Department
faculty of Science
A.A.U (Arat kilo campus)

17. Mathematics Department
Faculty of Science
A.A.U (Arat kilo campus)

18. Physics Department
Faculty of Science
A.A.U (Arat kilo campus)

19. Statistics Department
Faculty of Science
A.A.U (Arat kilo campus)

20. Geography Department
College of Social Sciences
A.A.U (Main campus)

21. History Department
College of Social Sciences
A.A.U (Main campus)

22. Philosophy Department
College of Social Sciences
A.A.U (Main campus)

23. PSIR Department
College of Social Sciences
A.A.U (Main campus)

24. Sociology Department
College of Social Sciences
A.A.U (Main campus)

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BIBLIOGRAPHY

1. Addis Ababa University, 1987 issue. School of Graduate Studies Catalogue Addis Ababa.

2. Anable, Richard. 1985. Addis Qetale : Observations and Recommendations On Library Automation for Addis Ababa University. Addis Ababa.

3. Beer, Gabel Jozia. 1989. Computers in the Third World Today. The Courier No. 113 (Jan-Feb) :56-62

4. Computers and Telecoms in Africa - a Merged Market? Computers in Africa Vol 3. No.5, Oct. 1989.

5. ECA, PADIS. 1988. The Use of Microcomputers in Documentation and Information Centres in Africa. Sixth Session of the Joint conference of African Planners, Statisticians and Demographers held at Addis Ababa; 21-28 March.

6. ECA, PADIS. 1990. The Use of Microcomputers in Documentation and Information Centres in Africa. Sixth Session of the Joint conference of African Planners, Statisticians and Demographers held at Addis Ababa; 15-20 January.

7. Gupta, Gopal K. 1987. Role of Computer Technology in developing Countries. Information Technology for Development 2 (1) March :46-54.

8. Haynes, David (ed.) 1990. Information Sources in Information Technology. Newyork : Bowker Saur Ltd.

9. Illingworth, Valerie. 1986. Dictionary of Computing. Oxford : Oxford University Press.

10 Informatics and Development, The Courier No. 113, (Jan-Feb);1989.

11 Kaul, Mohan (ed.) 1988. Information Technology in Commonwealth: The African Experience. London : Common Wealth Secretariat. 245-259.

12 Longley, Dennis and Michael Shain. 1986. Macmillan Dictionary of Personal Computing and Communication. London : Macmillan.

13. Munasinghe, Mohan (ed.) computers and Informatics in Developing Countries. Butterworths:Anchor Press Ltd.

14. Mwara, John. 1986. Issues on Computers and Development- A Kenya Perspective Vol:1, No.2, 1986.

15. National Research Council. 1988. Microcomputers and their Applications for Developing Countries. Boulder, Colorado: Westview Press.

16. Raghavan, S. V. 1991. Trends In Information Technology and Its Impact on Education and Training. Presented at Madras Library Association Seminar on Trends in and Impact of Informatics held on 23rd August 1991.

17. Rosenberg, Jenny M. 1986. Dictionary of Computers, Information Processing and Telecommuncations. New York : John Wiley.

18. Scott, R. J.P. 1979. Implications of Computer Use in African Socio-Economic Development. African Regional Symposium on science and Technology and the Future. Nairobi. 10 - 12 July

19. Seetharaman, M.N. 1987. National Scientific and Technological Information and Documentation Centre. [Ethiopia]. Bangalore, India.

20. Sirak G. Yohannes. 1988. Survey of the Development of Computer Use in Ethiopia. Addis Ababa.