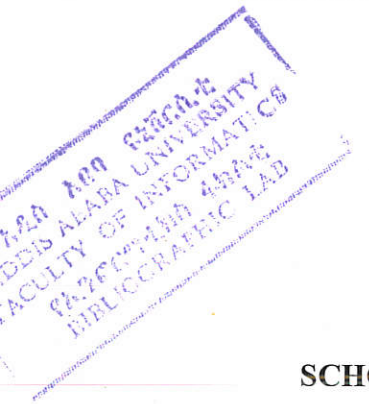
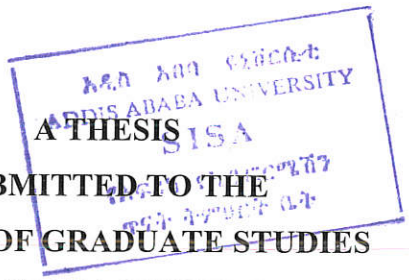
STRATEGIC EDUCATIONAL MANAGEMENT INFORMATION SYSTEM FOR HIGHER INSTITUTIONS: THE CASE OF ADDIS ABABA UNIVERSITY





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ENGIDA HAILYE

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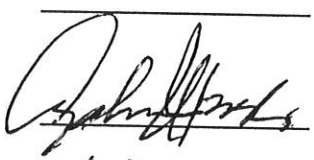
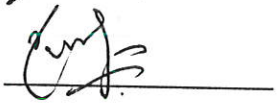
Ato Ayalew Shibeshi, Advisor 

Prof. A. Neelameghan, External Examiner 

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ABSTRACT

The purpose of this study was to make an investigation into some of the major factors that hindered the development of strategic information system in Addis Ababa University. It was also intended to identify the flow of information in the offices of the top managers of the University, the level of application of computers in the various academic and administrative departments, and to suggest appropriate information system architecture to support its administrative and academic activities.

To achieve these objectives, the existing information system was studied with particular reference to the application of computers in the various offices and the performance of the central computer center—System Design and Data Processing Center (SDDPC), including its materials and human resources, its weaknesses and strengths. It was observed that different types of computers are used in both the academic and administrative departments in the university. However, most of the computers are used to run word processing applications and for some rudimentary networking activities.

The central computer center uses very old technology (mainframe based system) and it runs short of skilled manpower. Because of this and other related factors, the center couldn't serve the University community as it should or as its stated objective in that nearly half of the academic and administrative departments do not even know the existence of the center. Furthermore, even the central administration of the University does not have on-line access to any of the data/information that the center keeps.

The investigation has also revealed that the university does not have clearly stated and well chartered information system plan/strategy and mission that guides the various efforts of independent segments to integrate information technology to their activities. The interview results indicated that the major reasons for the absence of well documented or clearly defined information system strategy are: other priorities being more important, budget constraints, low perception of the concept by the University administrators, lack of appropriate planning, lack of organizational/top management support, shortage of appropriate technical support staff, and absence of optimum use of available material and human resources.

The critical success factors of the University are identified to be: human resource, teaching, students' academic record keeping, students administration, academic information resources, research activities, and finance. The major organizational processes of the University, and the offices (managers) that perform these processes are identified. Information requirements for each organizational process are also determined.

Finally, based on the observed flow of information, a distributed (client/server) information system that is organized on hierarchical basis is recommended. It is suggested that information systems be organized following the lines of the functional areas. The lower level systems report to the higher ones and the University will have a central information system department that coordinates and supervises information system activities and projects in the University. This center which has its own sub units like systems development, networking, databases, programming, etc. will house the information system for the central administration that provides information to support their unstructured and semi-structured decision making activities.

CHAPTER ONE
THE PROBLEM AND ITS APPROACH

1.1 INTRODUCTION

The complexity of the society that we are living in is increasing from time to time. One of the major reasons of this complexity is the breed of information technology that necessitates new products and new ways of life. Such a situation has a strong influence in the life of individuals and in the success and survival of organizations. Organizations that operate in an ever changing environment should adapt themselves to the needs of the society they are serving.

Baker as quoted by Hills(1987) explains the change that results from information technology and the need to cope with it as follows.

> **Information technology is daily giving birth to new concepts, new products and new ideas, and radically transforming not only our industries and businesses, but every aspect of our lives.... There is great potential for significant improvement in our lives as a result of the new technologies, but our ability to benefit from technological advance will depend entirely on the speed with which we adapt to it.**

This rapid development in information technology affects all sectors of economic and social activities one of which is the educational sector. The changes in economic, political, technological and social activities will, in one way or another, affect and/or influence the performance of the education sector for these sectors are the major clienteles of the educational output. This is more true in higher education system (universities and colleges) since there is more direct relationship between the field of study of an individual and his/her career.

1.2 BACKGROUND OF THE ORGANIZATION

1.2.1 Establishment and Growth

Addis Ababa University, whose first name was University College of Addis Ababa, was founded on March 20, 1950 as a first step to the beginning of modern higher education in Ethiopia in the compound of the present Faculty of Science (Addis Ababa University, Undergraduate Catalogue, 1984). A number of colleges were established in the next decade in the country. In February 1961 the various higher institutions that were established in the country were brought together under the University College of Addis Ababa. The name of the University was changed to Haileselassie I University whose main campus was in the former palace grounds, the Emperor becoming its first Chancellor. The inauguration of the University was held on December 18, 1961.

Starting from 1962/63 a number of other colleges and faculties were established under the university. The university also expanded its activities in the continuing education program as of 1963. In general, in the succeeding years, various colleges and faculties such as Faculty of Education, the School of Social Works, the College of Business Administration, the Law School, the Faculty of Medicine were established.

Many of the programs of the University were restructured after the 1974 revolution as a result of the revision of the curricula to reflect the then situation of the country. Consequently, the name of the university was also changed to Addis Ababa University, new programs were opened and existing ones expanded. The Baher Dar Teachers College, The Awassa Junior Agricultural College, the Faculty of Veterinary Medicine are among the faculties and colleges that were newly opened under the Addis Ababa University; where as the Medical Faculty in Addis Ababa and the Gondar Public Health College were among the expanded ones. In 1978,

the university showed another remarkable improvement in its activities with the establishment of the School of Graduate studies to produce dedicated manpower and expertise required to respond to the skilled labor demand of the country.

Currently, Addis Ababa University has about 13 faculties, schools, institutes and colleges including the School of Graduate Studies which has both the masters and doctoral programs and the continuing education program. The university has more than 36 academic departments that run undergraduate programs and four research institutes. Among these departments, some have graduate programs in addition to the undergraduate levels.

1.2.2 Student Population

The student population of Addis Ababa University has been increasing from year to year particularly in recent years. Students enrollment is increasing faster in the regular undergraduate program than in the extension division (See Table 1.1). In general, the enrollment of students for the past five years looks like the following.

Table 1.1 Enrollment of Students in Addis Ababa University 1994/5—1998/99.

Program	1998/99	1997/98	1996/97	1995/96	1994/95
Undergraduate Regular	9657	9450	8200	6577	6774
Undergraduate Evening	8165	7866	7575	7291	7387
In-Service	1135	535	567	689	656
Graduate Program	781	796	714	719	419
Total	19738	18647	17056	15276	15236

Source: Addis Ababa University, Office of the Registrar, Statistical Report1994/5—1998/99.

The average annual increase in the students enrollment in the regular undergraduate program for the past three years is 1026 and for the undergraduate evening program is 291 which is at an average rate of 12.11% and 3.77%, respectively. This brings a considerable challenge for the management of the University every year. The number of graduates for the past five years is as follows.

Table 1.2 Number of graduates of Addis Ababa University for the past five years.

Program	**1997/98**	**1996/97**	**1995/96**	**1994/95**	**1993/94**
Undergraduate	2324	2184	1772	2108	1833
Graduate	251	232	195	189	173
Total	2575	2416	1967	2297	2006

Source: Addis Ababa University, Office of the Registrar, Statistical Report1993/4—1997/98.

The number of graduates leaving the University is also increasing in the recent years. This means that the University is providing more inputs to the external system (to the work

environment). These graduates however need to have some knowledge of the modern information technology so that they can be up to the expectation of their employers.

1.2.3 Employees

With regard to employees, according to the statistics in the beginning of 1997/98 academic year, Addis Ababa University has 710 academic staff of which 28 are foreigners; and 2,142 administrative workers out of which 1,753 are full-time whereas the remaining 389 are part-time employees. The student-teacher ratio is 29:1; whereas the student-administrative staff ratio is 9.2:1. On the other hand the ratio of the administrative staff to the academic staff is 3:1. This indicates that managing the students is more difficult for the instructors for they have more direct contact with the students. The increases in the number of students in the class contributes to the decrease in the quality of classroom education which in turn calls for additional facilities for the students and to assist the instructor.

1.2.4 Objectives of the Organization

The ultimate objective of the university is to produce skilled and well educated manpower who are armed with sufficient and relevant knowledge and skill to meet the demand of the various sectors of the society for workforce in particular and to solve the problems of the country in general. More specifically, the university is responsible for the following major functions.

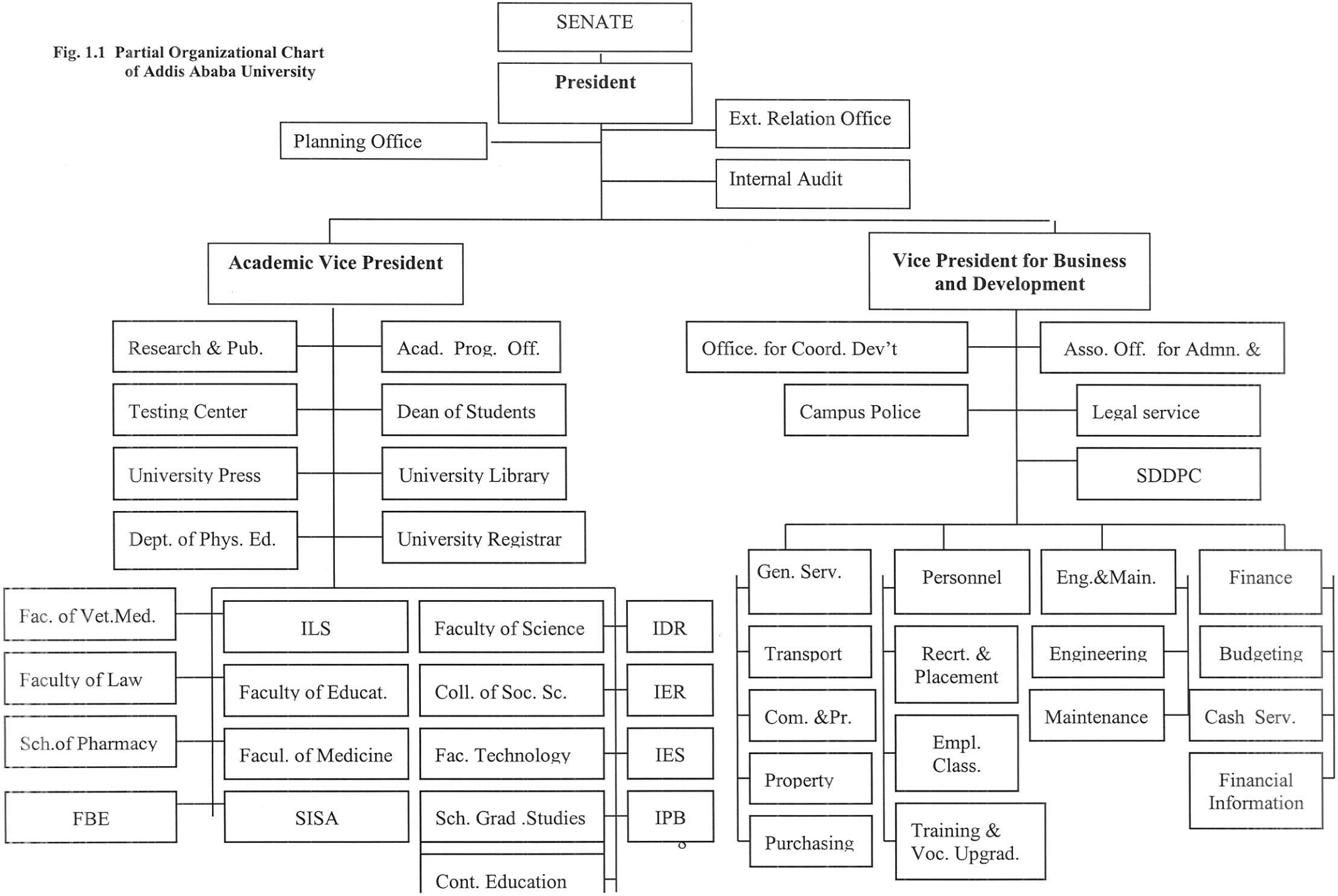
- Advance science and technology in the country
- Impart knowledge through teaching
- Develop/advance knowledge through research
- Study, preserve and develop the cultural heritage of the country
- Satisfy the manpower needs of the country

- Identify itself with the community by serving in all ways considered appropriate and best handled by the university (Addis Ababa University, 1984).

1.2.5 Organizational Chart of Addis Ababa University

Addis Ababa University is organized in to two wings: the administrative wing and the academic wing each headed by a vice president. The academic wing includes the faculties, colleges, schools, research institutes, libraries, etc. On the other hand the administrative segment consists of all supporting units like finance, personnel, general services, campus police, etc. The organizational structure of the University is presented on page 8.

Fig. 1.1 Partial Organizational Chart of Addis Ababa University



1.3 STATEMENT OF THE PROBLEM

In order to achieve the above mentioned objectives, the university needs to have the necessary resources one of which is information. Information is one of the major strategic resources now a days particularly in the face of the highly sophisticated and ever changing environment. Regarding the society ahead, Drucker (1992), as he calls it "knowledge society", argues that in such a society all organizations will necessarily operate on the flow of information and the center of gravity has shifted to the knowledge worker. Equipping the graduates with the necessary knowledge to enable them be active members of the organization they are employed in requires the collection and organization of information about the employing institutions and the kind of skill they need.

According to the researcher's practical observation and the responses of the Academic Programs Officer to the interview questions presented to him, Addis Ababa University has the following major problems.

1. Absence of well organized information system. According to Barta, Telem and Gev (1995) having a properly functioning school management information system improves:
    - quality of pupil administration
    - information available
    - quality of teacher administration
    - efficiency of school administration
    - evaluation of policy effects and
    - other organizational aspects

Addis Ababa University (AAU) does not seem to have a well established computerized information system that supplies necessary information regarding the existing situation and the future directions of the external environment. This is one of the major reasons for not timely updating or revising its curricula to harmonize its activities with the changes and activities of the society. For example, the currently available undergraduate catalogue is the one which was prepared in 1984 (before 14 years). The university is, however, currently working intensively to revise its curriculum.

The Academic Programs Officer also believes that higher institutions should evaluate their curricula every four or five years on the basis of the fitness of the graduates (batch) to the work environment. But Addis Ababa University does not have a channel that gathers information about the success or fitness of its graduates in the work situation. Except few departments which succeeded in introducing some courses or in replacing the phased out ones, most departments did not revise their respective curriculum for a very long period.

2. Even though the administrators appreciate the contribution that information technology can make to the administration of the institution, almost all of its activities (except few) are still manual. Among the major administrative activities, it is only the payroll section that produces electronically processed information (e.g. salary slip). Very recently, the finance division and part of the personnel section are automated to some extent even if they are not using state of the art technology. Other major segments of the system like registrar's office, the faculty record offices, etc. are still using the manual system. One of the major advantages of computerizing business activities is that information can be produced and disseminated faster (Szymanski, Szymanski, Morris and Pulschen, 1988).

3. Most academic departments except the ones in the Science Faculty, Technology Faculty and School of Information Studies for Africa, do not offer IT related courses to their students. According to the demand of the time, however, each department should have tailored information technology courses to integrate with its field of study. Every graduate from any department is expected to be acquainted with the basics of information technology. In other words, information technology courses should have been offered at least as a common course in the university. Currently universities and colleges of other countries are not only offering courses on information technology but they are also using IT to deliver contents or to assist the teaching learning process. Computer assisted instruction (CAI), multimedia learning—computer assisted learning where powerful computers capable of showing text, graphics, sound and motion are used in the teaching learning process (Matiru, Mwangi, and Schlette, 1995; Barta, Telem and Gev, 1995) are some of the examples where IT can be applied in the instructional activities. According to Barta, Telem and Gev (1995), many countries in the world are developing and implementing various IT strategies in the administration of their respective schools including tertiary education. For instance, Computer Assisted School Administration (CASA), is used by many countries like, USA, Great Britain, Hong Kong, Australia, etc. Information Technology for Educational Management (ITEM) is also being used by many countries (ITEM, 1995).

4. Wastage or under utilization of resources. The university does have many computers scattered in the various departments and sections. But most of these computers are used for word processing and teaching purposes. In fact some departments have quite a number of powerful computers but they don't offer the courses they are intending to offer. In this case the resources are simply stored without being used for the purpose they are intended

for. Furthermore, this poses a question like "on what basis did the departments acquire the materials?" Is it really need based? If so, why are the computers stored for more than two years? This can also be an indication of lack of proper coordination of available resources to get the maximum possible benefit from them.

5. Lack of computer literacy and properly skilled manpower among the employees. The university does not have sufficient number of trained personnel for user support, maintenance, training, and customizing software's to the needs of the university. There are many workers from both the academic and administrative workers who are not familiar with the basic operations of the technology. Even those who can operate, use it only for limited applications like word-processing. When workers are not properly assisted to use the technology, they may be frustrated and will be resistant to change. Therefore to be beneficial from the advancing information technology training and end user computing need to be part of the IT and information system strategy related activities in any organization.

6. Emergence of new colleges (competitors). Recently a number of new colleges are emerging in many administrative regions of the country. Two additional colleges are newly founded in Addis Ababa alone. Even though most of these colleges are owned by the government like the university itself, they are competitors in the area of employment of graduates and in the use of educational resources. Furthermore, they are working well to increase their efficiency and popularity and to improve their market share in consultancy, joint research with organizations and regions, etc. The African Virtual University (AVU) is also another newly emerging learning environment where instruction is given through electronic media. This leads to decline if necessary and corrective

actions are not taken accordingly. One of the contributing solutions can be building the required strategic information system and integrating IT in educational management. Information is now seen as a strategic resource, a potential source of competitive advantage, or a strategic weapon to defeat and frustrate the competition (Laudon and Laudon, 1988).

Generally, Addis Ababa University, has a strong challenge both internally and externally. In light of what is expected of higher institutions as agents of change, the university is not doing well in the information technology area. As Burgen (1996) states, "the university is the agent of change and is changed by it." According to Burgen, higher education should be more flexible to reallocate resources and to regroup its potential in order to adapt in areas in high demand. The weakness of Addis Ababa University includes lack of systematic planning of the curriculum and the courses which is mainly because of the absence of reviewing and updating the curriculum or courses, lack of measurement of results, wastage of resources, etc. Therefore it lacks:

(1) Internal efficiency—the ability to use resources properly within the system;

(2) External Efficiency—the effects of its outputs (graduates) on social development.

In fact, the university is currently working on "program review"—the activity being taken to examine:

- the relevance of each department to the needs of the country
- the resource and capacity or facilities of each department
- if there are redundant programs, etc.

This is being done on the basis of both internal and external assessment on all academic departments and the university has taken it as a major current project that demands the attention of all concerned parties. The other recent development is the "grand network project" that the university is seriously working on to integrate the various faculties, colleges, institutes, etc. to the central administration of the institution. This project is being done by a committee set up by the president of the university and it requires huge investment. This is a step forward to introduce information technology to the university administration to support and facilitate the instructional and managerial activities.

These activities, however, need to be well coordinated by establishing a system that brings the various activities together in order to gain from the investment as expected and not to lose scarce resources devoted for the purpose. Such a system can also help to wisely allocate resources in order to perform the already started effort in a sustained manner.

1.4 OBJECTIVES OF THE STUDY

1.4.1 General Objective

The general objective of this study is to investigate the sources of the already identified problems, to identify the information needs of top management of the university, to determine the nature and flow of information in the offices of the top management, and to suggest appropriate strategic educational management information support system to alleviate the problems under consideration.

1.4.2 Specific Objectives

The specific objectives of this study are the following:

- Evaluating the existing information system that is used by the top management of the university
- Evaluating the procedures in developing and/or revising the curriculum of the university
- Identifying the information needs of the top management
- Assessing the technical capacity of the university in terms of skilled manpower who can be in charge of developing, and maintaining strategic educational information support system for the university
- Identifying the critical success factors of the university so that it will be up to the expectation of the society and the government. Critical success factors are internal to the organization and provide a means of establishing the extent to which vision, mission and values, as well as customers' wants and needs, are being met (Bush and West-Burnham, 1994)
- Identifying the procedures to develop educational management information support system
- Demonstrating the significance of establishing the above mentioned system by presenting the advantages that will be gained from its establishment

1.5 METHODOLOGY

The objective of this study, as indicated earlier, is to evaluate the various factors that may have hampered the proper development and use of educational management information support system, to make the necessary assessment regarding information needs of the top administration, and to suggest appropriate educational management information system that can be in place for the smooth running of the system.

In order to achieve the stated objectives, the study employs the descriptive survey method of research to widely handle the problem. In doing so a number of fact finding and systems analysis techniques can be used for one method can't fully serve the purpose. As far as this paper is concerned, the following methods will be employed.

1.5.1 Document Analysis

This technique provides information on how the existing system functions. Document is any written material that contains information about the performance of the university. This includes the rules and regulations, forms, reports, records on number of students and teachers, etc. Therefore document related to all these, and to the existing and previous attempts of the university to integrate information technology and/or develop management information support system for its consumption will be assessed.

1.5.2 Interview

Interview brings the researcher with the users and the top management of the university which helps to probe them for more specific responses. Since the intended educational management information support system is more of strategic in approach—being useful more for the top decision makers, the target group is the top officials of the university. Therefore, both structured and unstructured interview will be used to gather data from the officials.

Literature review was also made for the following purposes.

- To assess previously attempted tasks in the area and to determine its weaknesses and strengths on the basis of which alternative solution and action for

improvement can be suggested. In the mean time it helps to avoid repetition of activities.

- To examine the experience of other similar institutions and to test the various models that are used to plan and implement management information systems in the educational environment, particularly in universities and colleges. The models may be taken from different sources, such as, universities of other countries, UNESCO, Ministry of Education (if any), etc.

For the purpose of analyzing the existing information system and the flow of information to, within, and from the offices of the top management, the flow charts and tables (matrices) are used

1.6 SOURCES OF DATA

Both primary and secondary sources of data are used to gather information. The top management of the university, the deans, and other potential users are the primary sources for which interview will be administered. The secondary sources include books, journals, and other printed or electronic sources.

1.7 DELIMITATION OF THE STUDY

Addis Ababa University (the subject of the study) is a large institution with many faculties and departments (both academic and administrative). Attempting to develop information system that serves every segment of the University will be very difficult for a single researcher in a semester's time. In addition this kind of project, as a matter of necessity

requires direct and active involvement of the user departments, the concerned managers at all levels particularly the executive managers and systems personnel.

Therefore, the scope of this paper is delimited to only the study of information systems planning and feasibility study. It presents only the general information system architecture that can be in place to facilitate information flow in the University in general and in the officers of the top managers in particular to assist their decision making processes.

Although high emphasis is given to information requirements of top managers and their information sources, the practical development of the system is left for system developers. The planning and feasibility stage ends at project identification level. Furthermore, even though an attempt is made to work on organizational information requirements analysis it is done in condensed and general form at the University and/or top managerial level. The detail flow of information in each and every segment of the University needs to be identified during the systems analysis and design stage.

1.8 JUSTIFICATION OF THE STUDY

Any research should help in solving some kind of problem if it is to be conducted particularly in developing countries, like ours, where resources are very limited. The importance of the research can be established on the basis of the contribution it makes. As far as this study is concerned, it serves the following purposes.

- It helps the top administrators understand or realize the importance of well organized, computer-based educational management information support system to ease the management of the university in harmony with the expectation of the society.

- It shows how information technology and/or information system can be applied or integrated to the management of educational institutions.
- It helps to determine the critical success factors for the university so that it can be the best supplier of skilled manpower to the country.
- It can also serve as a "stepping-stone" for those who want to conduct further and detailed research in the area.

1.9 LIMITATION OF THE STUDY

In addition to identifying the information system architecture for the University, this study, originally intended to investigate the information flow and requirement in the offices of the top management. Specifically, the intention was to consider the officers of the president , the Academic Vice President, Vice President for Business and Development, and the Academic Programs Officer.

Unfortunately, the two vice-presidents were abroad for more than a month during the critical time of this study and it was also difficult to contact them after they were back to office. An interview question was also prepared and given to the President of the University, however, he returned the questions without addressing them stating he was busy. It was only the Academic Programs Officer who was interviewed twice. In fact he was also delegated to temporarily act in the office of the Vice President when the latter was abroad. Therefore, his response was also on behalf of the office of the Academic Vice President.

In addition, due to the absence of any similar study and related reference in Educational Information Systems Planning, the researcher relied only on foreign reference materials which

are mostly books. This is so because the researcher couldn't find much on journals and articles regarding the issue.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 MANAGERS AND THEIR INFORMATION NEEDS

In most organizations the managerial hierarchy is basically divided in to three levels: the top or Strategic management, middle level or tactical management, and operational or supervisory management. The information needs of the managers at different levels of the managerial hierarchy will also differ accordingly.

Top or Strategic Managers. These managers are the executives at the highest level of the organizational hierarchy. They are responsible for the overall coordination of the business and for directing the activities of the various divisions or units of the organization. The time of the strategic managers is divided between performing major company wide planning, organizing, directing, controlling activities and attending to the demands imposed on the organization by various external groups like the government, customers, etc.(Pearce and Robinson, 1989). This category of managers includes board of directors, president, vice presidents, chief executive officers, etc.

These managers deal with strategic issues and long term plans both in the organization and in the external environment. The kind of information input they need is highly condensed and comprehensive in nature; and source of this information is both internal and external.

Middle or Tactical Managers. These managers are in the intermediate level of the managerial hierarchy between the executives and the operational managers. They are typically defined in terms of their reporting relationships in the organization. That is, operational managers report to them and they in turn report to executive managers of the institution. Stoner (1989) state that the principal responsibilities of the middle managers are to direct the activities that implement their organization's policies and to balance the demands of their superiors with the capacities of their subordinates. These managers need up-to-date but summary information on the operation of their functional areas and sometimes about the whole organization.

Operational or First-line Managers. These are at the lowest level of the managerial hierarchy next to the non managerial employees. The titles they may have include supervisor, foreman, project manager, coordinator, etc. First line managers direct operating employees only. Activities at this level are routine and highly structured for which readily available rules and regulations can be applied. The information demand of these managers is related to day-to-day transactions and frequently occurring events or operations.

The above mentioned managerial hierarchy is clearly reflected in Addis Ababa University. The executive mangers, middle level managers and first line or supervisory mangers are indicated as follows.

Executive or top managers

- The President
- Academic Vice President
- Vice President for Business and Development
- Academic Programs Officer

- Associate Office for Administration and Development

Middle level managers

- Deans of faculties, colleges and institutes
- Directors of research institutes
- University librarian
- Registrar officer
- Deans of students
- Director of systems design and data processing center (SDDPC)
- General Service Department manager
- Engineering and maintenance manager
- Personnel Administration manager
- Financial manager

First line managers

- Heads of academic departments
- head of Testing Center
- Transportation Division head
- Property and Division head
- Engineering Division head
- Maintenance division head and other division heads in the administrative segment

2.2 THE NEED FOR INFORMATION SYSTEMS/INFORMATION TECHNOLOGY

Managers need information for different basic reasons. It has now become very difficult to make any kind of decision without information since information is needed for every step in

the decision making process. Turban, McLean and Wetherbe (1996) emphasize the need for computer based information system to support the decision making process of managers. They state that "making decisions while processing information manually is growing increasingly difficult due to the following trends."

- **The number of alternatives to be considered is increasing due to innovations in technology, improved communication, and the development of global market.**
- **Many decisions must be made under time pressure. Frequently, it is not possible to manually process the needed information fast enough to be effective.**
- **Due to increased fluctuations and uncertainty in the decision environment it is frequently necessary to conduct a sophisticated analysis to make a good decision. Such analysis usually requires the use of information technology.**

Most of the above mentioned points will apply to Addis Ababa University. It is worth mentioning an instance where the University was expected to make instant decision and take all the necessary correcting measures. It was in the last week of August, 1998 that the Academic Vice President of the University received a letter from Ministry of Education requesting the University (Faculty of Education in particular) to revise the curriculum of a given academic department as of the 1998/99 academic year (which has been to start on the 7th of September). The reason was that Ministry of Education could not employ the graduates of that specific department at least for the coming two or three years until the vocational secondary schools are organized according to the new educational and training policy of the country. Because of the difficulty to decide upon the matter the students of the Department are still taking the courses in the old curriculum.

One of the reasons for such a problem is lack of awareness about the future direction of the educational situation in the country and lack of immediate and necessary adjustment to cope

with the changes. This implies that having necessary and timely information is mandatory for the success and survival of organizations.

2.3 UNIQUE FEATURES OF ACADEMIC INSTITUTIONS

Academic institutions (Schools, Universities, colleges and institutes) are part of service giving organizations like hospitals, airlines, etc. They provide service to their clients than products to the customers. The information system of these kind of organizations will be different from the information system of a manufacturing company or production oriented environment. In terms of information requirements and information systems of the service sector, one finds a number of differences from the ones for manufacturing or production sector. Some of these differences are described as follows (Rowley, 1994).

1. The establishment of performance measure is difficult. Even if it is possible to establish a performance measure, it may not be possible to quantify the measure or the benefit of having the information system. For example it will be entirely difficult to state, in monetary terms, the benefit of developing computer based information system for Addis Ababa University. However, this can be done for a manufacturing business by quantifying the percentage of increase in the output because of the introduction of the said information system.
2. The service sector in our country, Ethiopia, spans both the private and public sector and may be subject to more extensive controls and government intervention. For instance, the university under consideration is a government institution. This intervention may lead to less stable strategic objectives.
3. There is unlikely to be a need for production transaction processing systems or management information systems for functional areas. However, other data may

be maintained on the extent and nature of the use of the services offered. In fact, there are some information systems that can be commonly applied to all kinds of organizations. For example, all organizations need management information on financial matters and a financial management information system needs to be in place for all organizations.

4. Transactions in the service sector are also different from that of the production sector. This is so because the transactions that need to be recorded are also different. Most of the time the management information system extracts information from the transaction processing systems and, therefore, the MIS will also be different.

In general information system for the service sector need to offer managers:

- and executives a summary of the resources available for use and for supply for the customers like the number of classrooms available, the number of academic and administrative staff available to fulfill specified roles, the number of beds in a hospital or in a hotel, etc.
- a summary of how these resources are being used so that they can measure their success. Typical information can be the number of classrooms used, the number of operations performed, or the number of students or customers served.
- operational data on problems that have arisen, including staff problems, students problems, resources problems, etc.
- a summary of the financial situation, indicating how income and expenditure are adhering to budget.

2.4 TYPES OF INFORMATION SYSTEMS

Information systems can be classified in to different types based on different criteria. Such classifications can be made on the basis of organizational levels, major functional areas, support provided by the system, and information systems architecture.

Classification according to Organizational level. Organizations are composed of sub units like departments, teams or functional areas. For example, they have human resource or personnel department, finance or accounting department, production department, etc. All these report to higher level hierarchy like divisions or headquarters. One way of organizing information systems is to build them along organizational structure lines. In this kind of information system one can find information systems built for organizational divisions, departments, operating units and even for individual employees (Turban, McLean and Wetherbe, 1996). These systems can be stand alone or interconnected. The major disadvantage of this kind of organizing information systems is that there can be similar departments at various levels. In fact, information system can be organized: either on divisional basis including all activities in the division or centralized information system on the basis of functional areas at the corporate level. The typical information system, according to Turban, McLean and Wetherbe (1996) that follow organizational levels are:

- Departmental information system—the use of several application programs in one functional area.
- Enterprise information system—a collection of applications in several or in all functional areas.
- Inter organizational systems—done when some information systems become complex and involve several organizations like airlines.

Classification according to major functional areas. These are information systems organized on the basis of major functional areas and they are called functional information systems. These include:

- accounting information system
- financial system
- production system
- marketing system
- human resource management system, etc.

Each functional area has major computerized tasks that are essential for the operation of the organization.

Classification according to the information system architecture. Information architecture is conceptualization of information requirements that relate to the central businesses or activities of the organization. This will then be related to the kind of organization of information system for the business. It can be mainframe based system, stand alone personal computer system or distributed system with several variations.

Classification according to support provided by the system. The fourth and major way to classify information systems is on the basis of the kind of support they provide despite the functional area involved. Accordingly, they are classified as transaction processing systems (TPS), office automation systems (AOM), management information systems (MIS), decision support systems (DSS), and executive information systems(EIS) (Turban, McLean, and Wetherbe, 1996; Laudon and Laudon, 1988).

2.4.1 Transaction processing systems

Transaction processing systems support the monitoring, collection, storage, processing and dissemination of the organization basic business transactions. These are computerized systems that perform and record the daily routine transactions necessary for the conduct of the business. Tasks, resources and goals at the operational levels of the organization are predefined and highly structured. For example, the decision to promote a student to the next level or not, to admit a new student or not, or to let a student graduate or not, to calculate the net pay of the worker, etc. are highly structured and can easily be computerized through the use of transaction processing systems.

Since transaction processing systems support the mission-centered operations they are considered crucial to the success of the organization. The major information inputs of a transaction processing system are transactions and events. The kinds of processing it performs include sorting, listing, merging, and updating. The outputs are detailed reports, lists, and summaries, etc. Operations personnel and supervisors are the primary users of the information output.

Transaction processing systems have two basic features (Laudon and Laudon, 1988):

1. They bridge the boundary between the organization and its environment in that they connect the customers and the management of the organization. If these systems are not working well it appears difficult for the organization to receive inputs from the environment and to deliver outputs to the users.

2. Transaction processing systems are major producers of information for other systems at the higher level of the management hierarchy. When managers want to

assess the organizational performance, they can easily obtain up to date information from transaction processing systems.

Some of the areas where these kinds of systems can be applied in Addis Ababa university are:

- registrar's office
- bookstore
- library systems
- finance system
- personnel system
- book center
- inspection, etc.

2.4.2 Office Automation systems

These are computerized devices and systems devoted to document the message processing for the purpose of increasing the efficiency and effectiveness of performance in the office. These systems support both clerical and managerial functions. Office automation systems include word processing, document storage, graphics, reproduction and electronic mail systems.

2.4.3 Management Information Systems

Management information system is a system that supports the management of the functional areas by providing periodic information for managers and other employees on such issues as operational efficiency, effectiveness and productivity. It also serves the functions of planning, controlling and decision making at the management level. Management information systems condense information obtained from transaction processing systems and present it to managers in the form of reports. MIS primarily serves middle level managers. Its

information input can be summary transaction data, high volume data, and simple models; where as the output will be summary and exception reports.

In the case of Addis Ababa University, this kind of system can be used in the Deans' office to coordinate the performance and management of the various academic departments. It can also be used in the various departments of the administrative segment to coordinate the activities of these sub units on the basis of which sound decision can be made. This can include financial systems, personnel systems, etc.

2.4.4 Decision Support Systems

These are interactive computer-based systems, which help the decision makers utilize data and models to solve unstructured problems (Morton as quoted by turban, McLean and Wetherbe, 1996). Decision support systems have analytical capabilities that permit the user to employ several different models to analyze information. These systems draw on internal information from TPS and MIS and they often bring in information from external sources.

2.4.4.1 Characteristics and Capabilities of DSS

Turban, McLean, and Wetherbe (1996) identify some major characteristics and capabilities of decision support systems.

1. Decision support system (DSS) provides support for decision makers, mainly in semi-structured and unstructured situations, by integrating human judgment and computer information.
2. Support is provided for various managerial levels, both to individuals and groups. DSS provides support to several interdependent and/or sequential decisions.

3. A DSS supports all phases of a decision making process—intelligence, design, choice, and implementation. A DSS is also adaptive over time enabling the decision maker to easily confront changing conditions quickly. In semi structured and unstructured problems change can occur very rapidly.
4. A DSS is easy to construct. User friendliness, flexibility, strong graphic capabilities can greatly increase the usability of a DSS.
5. A DSS usually utilizes models. The modeling capability enables experimenting with different strategies under different configurations.
6. Advanced DSS are equipped with a knowledge component that enables the efficient and effective solution of very difficult problems. It also includes easy execution of sensitivity analysis which can increase the confidence of the decision maker. Most DSS include a "what if" sensitivity analysis and "goal seeking" analysis.

DSS can be developed for personal use or for organizational use. Personal DSS support the work of professionals and middle level managers; where as, organizational DSS provides support primarily to planners, analysts etc.

2.4.5 Executive Information (Support) Systems

An Executive Information System (EIS) also known as Executive Support System (ESS) is a technology that support the decision making processes by senior managers. Hence, they serve the strategic level of the organization. Turban Mclean and Wetherbe (1996) support that executive information systems are user friendly, and is supported by graphics and provides "exceptions reporting" and "drill down" capabilities. It can also be easily connected with on-line information services and electronic mail. Executive Support System is a comprehensive

support system that goes beyond executive information system to include analysis support, communications, office automation, and intelligence.

2.5 STRATEGIC MANAGEMENT AND DECISION MAKING

Strategic management is the task of executive mangers. Strategic decisions are those decisions that are concerned with the entire environment in which the firm operates, the whole of the resources and people who constitute the company and the interface between the two (Luffman and others, 1996). Failure to match the organization's outputs to the environment can have devastating consequences.

The outputs of Addis Ababa University are graduates from the various fields of study. These graduates need to have the necessary knowledge and skill to meet the demands of the work environment in the various sectors. When the external environment changes either part or whole of the university is expected to make necessary adjustments to adapt to the changing situation. Hence strategic management needs to be part of the University administration the essence of which is to anticipate change although it appears difficult to clearly understand the full extent of a given change in advance. It also helps to minimize uncertainty.

2.5.1 Features of Strategic decisions

Strategic decisions are concerned with the whole business, not with a segment of a business in particular or any one of the functional areas. Strategic or corporate decisions are about the long term activities and objectives of the business. They are almost always unstructured. These decisions need to be reviewed timely so that the major opportunities and treats are identified at an early stage.

Because of the long term and holistic nature of strategic decisions they are always unique. Furthermore, since no two organizations are identical in terms of management style, products or services, and resources, it is unlikely that experience from other companies will be of direct benefit (Luffman and others, 1996). Strategic decisions are the point from which all other decisions and activities in the company emanate. They therefore provide direction and thus motivation in that most people prefer to know the purpose and objectives of the organization to which they belong.

It is also the key role of strategic decision making in the organization to integrate various activities within the company and to allocate resources. Therefore, integration and allocation become key outcomes of strategic decision making. According to Beaumont and Sutherland (1992) the essence of strategic management should be action rather than the process of developing the strategy or the document itself with the ability to cope with uncertainty, devolve responsibility and retain control.

The process of strategic formulation adopted by different organizations can vary from extremely formal and systematic set of procedures for analysis and planning to an ad hoc reaction by the senior management of an organization to perceived problems (Beaumont and Sutherland, 1992). In any case, managers are required to consider both internal and external sources.

The strategic formulation context developed by Porter (as quoted in Beaumont and Sutherland, 1992) is modified as follows to fit in to the University situation under consideration.

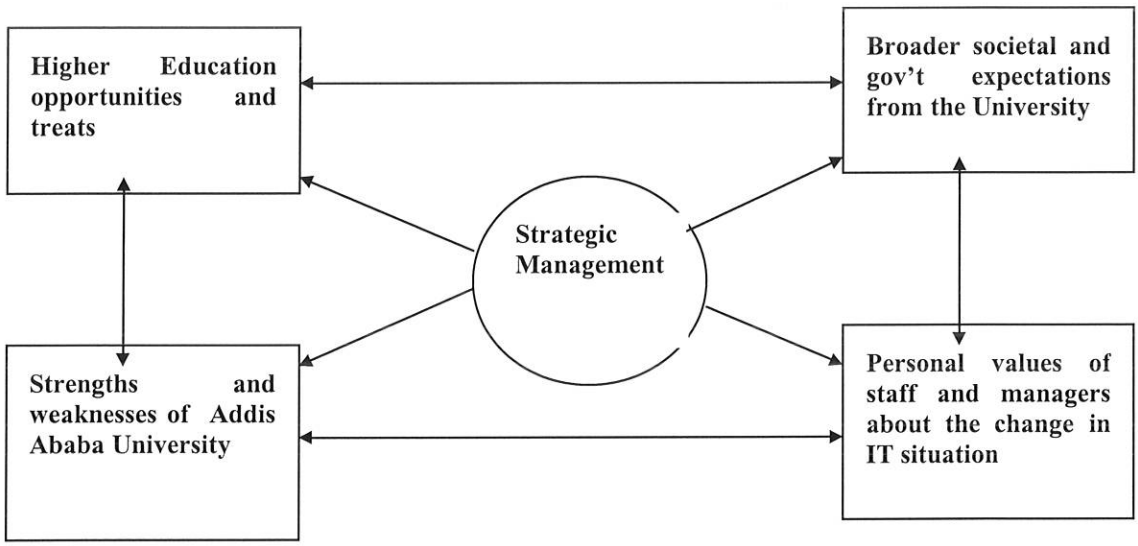


Fig. 2.1 Strategy formulation *(adapted & modified from Beaumont and Sutherland, Information Resource management: Management in Our Knowledge-Based Society and Economy. Oxford: Butterworth-Heinemann Ltd. 1992)*

As Turban, McLean and Wetherbe (1996) argue strategic management has three complementary elements: long range planning, response management and innovation.

Long range planning is a traditional approach by which introduction of significant changes into the organization is incorporated through time. Moving to a new product line, expanding the organization by acquiring supporting business activities etc. Are some of the examples that require long range planning. Response management on the other hand is a strategy that focuses on an organization's quick reaction to protect itself against some change in the environment or a competitor's actions. Such a response is considered strategic if the change that triggers it is so significant that unless a quick response is undertaken, the well being or even the survival, of the organization may be in jeopardy (Turban, McLean and Wetherbe, 1996).

On the contrary, organizations may use a proactive strategy in that they introduce innovative changes that give them a competitive advantage in the short run. Innovation is strongly

related to information technologies—creativity and idea generation. Turban, McLean and Wetherbe (1996) state that information technology contributes to strategic management in many ways. The following three are the major ones.

1. Information technology creates applications that provide direct strategic advantage to organizations.
2. Information technology supports strategic change such as reengineering. For example, information technology allows efficient decentralization by providing speedy communication lines, and it streamlines and shortens product or service design time.
3. Information technology provides business intelligence by collecting and analyzing information about innovations markets, competitors and environmental changes.

2.5.2 Strategic Information Systems

As defined by Cavaye and Cragg, quoted in Fidler and Rogerson (1996), strategic information system is a system that is used to support strategic decision making or to support or shape an organization's competitive strategy, or it might be used as a combination of both. According to Fidler and Rogerson (1996), for a system to be considered a strategic information system it must satisfy two essential criteria.

a. the system is directly linked to the business strategy
b. The system significantly affects organizational performance.

Strategic systems deal with long term situations and decisions that significantly change the manner in which activities are being performed. These systems are taken to be one on which

the organization's survival, growth and future direction is critically dependent (Willcocks, 1994). The fact that information system is seen as strategic implies that it is seen as important, even essential, in achieving business objectives and strategies.

2.5.3 Types and sources of Strategic Information

The type of information necessary for top managers can be categorized in to two ways: according to its function and its content (Rowley, 1994).

According to the function or purpose it serves to top managers, information can be organized in to seven major classifications.

a. Comfort information—keeps mangers informed about a given situation or achievement levels, and allows them to know that performance is in line with expectations. Some of the examples of information in this category are information on this month's systems down time, number of students enrolled in this semester, etc.

b. Status or progress information—which keeps mangers abreast of current problems and crisis, e.g. status of construction work in a new faculty, progress on research and development efforts in a given area, etc.

c. Warning information—signals that changes are occurring, either in the form of emerging opportunities or impeding troubles. This kind of information can include fluctuation in the numbers of students enrolled, difficulties in employing qualified instructors and researchers, brain drain, etc.

d. Planning information—descriptions of major future developments and programs, such as establishment of new colleges, new ways of instruction (e.g. AVU),

advancement of a program to a higher level, changes in the skill demand of employers, etc.

e. Internal operations information—key indicators of how the organization or individuals are performing, which is useful for reporting the overall health of an organization. This can be information on the operation of the various segments of the University.

f. External intelligence—information and opinions about activities in the environment of an organization. For example, the performance of other colleges and universities, educational policy changes, etc.

g. Externally distributed information—information that top management need to review before its release to shareholders, or distribution to news media.

When one tries to classify the same information on the basis of its subject or content, it can be categorized in to two: external and internal information.

External information is the one that is obtained from the environment. It includes information on labor market, economic conditions, educational structure, social trends, technological changes, political situation, etc. Internal information is about the performance or operation of the internal segments: personnel information—academic staff, administrative staff, necessary skills and qualifications; financial information—budgets, costs/expenditures, cash flows; research and development activities information; information on classroom allocation and intensity of use, instructional situation; information on library situations, etc.

2.5.4 Characteristics of Strategic Information

Information provided to strategic decision makers has the following characteristics (Rowley, 1994).

- Largely concerned with the future.
- It is both qualitative and quantitative--data includes opinions, judgments, insights and observations.
- Largely informal—it should not be too structured.
- Boundary free—a holistic view of the organization must be achieved without undue emphasis to one segment or the other.
- Multidimensional—all relevant facts need to be considered, irrespective of their focus.
- Largely external—much information is required from the external environment.

2.6 STRATEGIC INFORMATION SYSTEM PLANNING

Strategic information system planning is the means of identifying application systems which support and enhance organizational strategy and provides the framework for the effective implementation of the systems (Fidler and Rogerson, 1996). A strategic information system plan is a process of establishing a program for the implementation and use of information systems in such a way that it will optimize the effectiveness of the firm's information resource and use them to support the objectives of the whole enterprise as much as possible (Rowley, 1994).

Initial efforts to establish planning and control systems for information systems started in the late 1950's and early 1960's when information technology resources were expended on

developing new applications and revising existing operation application systems (Turban, McLean and Wetherbe, 1996).

The initial mechanisms of planning and control systems addressed operational information systems planning. Because of the increasing sophistication of organizations in their use of information systems emphasis shifted to managerial information systems planning. This shift has manifested itself through the organization of information system function in to a corporate computing utility. For example a form of charge out method—users payment for the computing and information services they use, has been adopted in an effort to shift accountability for information system expenditures to users. This and other efforts had an effect on planning of information systems. Annual planning cycles were established to identify potentially beneficial information system services, to perform cost-benefit analysis (Turban, McLean and Wetherbe, 1996).

Even though many organizations are applying the traditional approach of information system planning, specifics of the information system planning process will vary among organizations. Now a days planning for information system integration has become necessary for the purpose of getting the maximum possible benefit from the huge investment that information system requires. There are major issues that should be considered in information system planning process. These are:

- Planning is a dynamic and participative process that needs careful set up and refined management.
- Information technology is still rapidly expanding and is offering increasing number of new opportunities at continuously decreasing cost. Identification and application of the best alternative for individual and organizational consumption is

becoming a complex and difficult task. The difficulty and complexity emanates from unknowns, uncertainties and constraints which are prevalent in the constantly changing environment.

- Planning in the information processing field needs to be considered as an investment opportunity, not as an analysis of expense minimization scheme only.
- Changes in the proliferating information technology significantly affects the behavior and performance of both individuals and organizations. This calls for a carefully structured planning function to get optimal understanding, acceptance and motivation to see a project through.
- There needs to have the necessary skill and capability to avoid duplication of efforts and needless development costs. In this regard sharing of resources and necessary materials needs to be considered as a viable option in the traditional "make or buy" decisions, (Emery, 1980).

2.7 PROBLEMS OF INFORMATION SYSTEM PLANNING

According to Turban, McLean and Wetherbe (1996), the most common problems with traditional information systems planning can be summarized in to four categories.

1. Aligning the information system plan with the overall strategies and objectives of the organization
2. Designing an information system architecture for the organization in such a way that various databases can be integrated.
3. Allocating information systems development and operations resources among computing applications.
4. Completing information system projects on time and according to budget.

The major problem in information system planning process is to identify and select information systems and applications that fit the priorities established by the organization. Sometimes organizational strategies may not be clearly stated in writing or they may be stated in terms that are not useful for information systems planning. In this case it will be difficult to ascertain the strategies and goals to which the information system should be aligned.

Information system architecture refers to the overall structure of all of the information systems in an organization. This structure consists of applications for the various managerial levels of the organization. It also includes databases and supporting software. The information system architecture for an organization should guide long range development as well as allow responsiveness to diverse short range information systems demands. Failure to have good architectural planning is best manifested in no integration between the systems that various segments of the organization are running independently.

The other problem is the rational and optimum allocation of resources for information systems development among the competing organizational units. This problem will be more serious if the information system strategy is not linked to the present and long-term strategy of the entire organization. This concept of linkage is often referred to as strategic alignment where the strategies of each individual elements in the organization and the strategies of the IT/IS division are linked to achieve the overall objective of the organization. The linkage of business, information and human resources is crucial for the well being of an organization (Fidler and Rogerson, 1996).

As Ernst and Young (quoted in Fidler and Rogerson, 1996) argue there are three possible linkages which are commonly called strategic triangle model.

- Information system and human resource—this alignment aids organizational effectiveness as well as other efficiency gains associated with such alliance.
- Information systems and business—this linkage can result in innovative solutions to business problems like introduction of automatic systems in some institutions like banks.
- Business and human Resource—this linkage enables organizations to remain dynamic and helps them to respond to changes in their environment.

The concurrent or parallel existence of these three linkages is strategic alliance. Organizations which successfully combine the ability to innovate, respond to change and streamline will produce enhanced organizational value (Fidler and Rogerson, 1996).

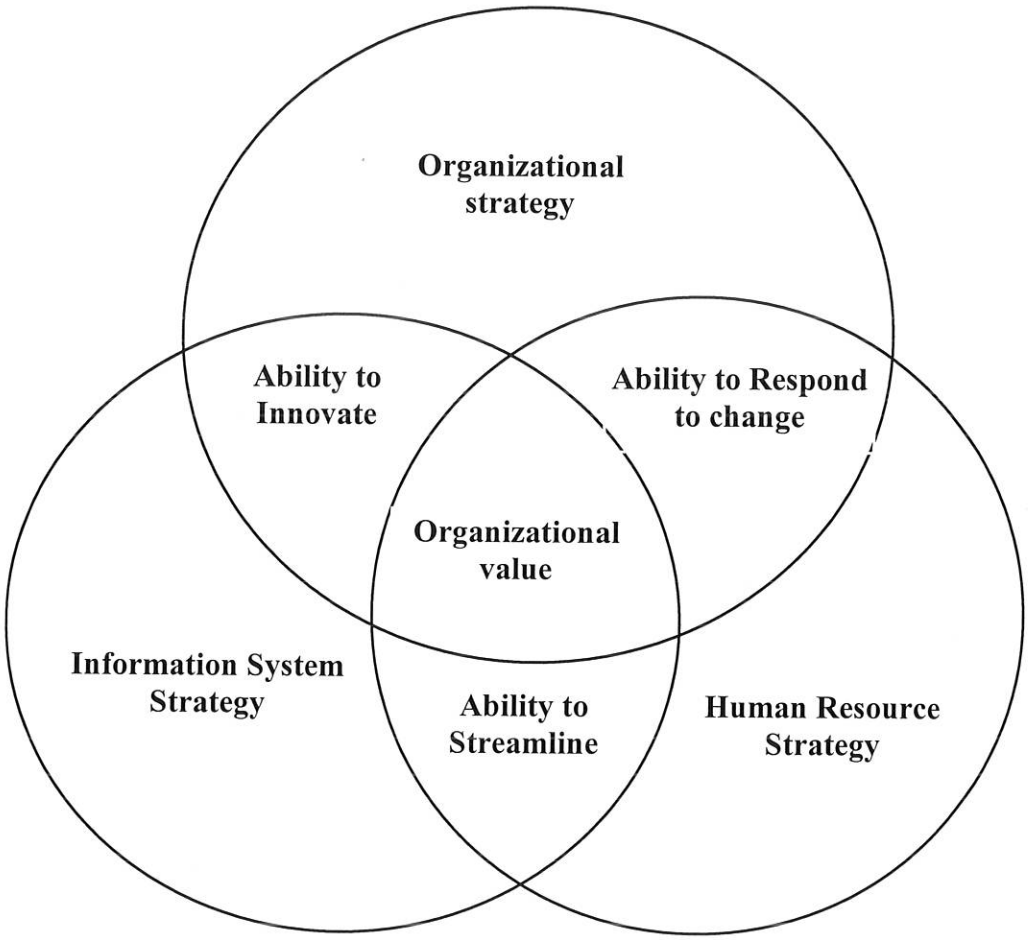


Fig. 2.2 Strategic Alignment Model ***(Adapted from Fidler, Christine and Simon Rogerson, Strategic Management support Systems, London: Pitman, 1996***

Rowley (1994) argues that strategic information system planning has emerged from the need to match computer applications with the objectives of the organization in order to maximize the return on investment in computer systems, as well as the return earned by the organization as a whole. Strategic Information system planning emphasizes that effective information systems are those that are designed to support the organization's objectives or strategies. SISP can have a significant impact on information systems practices, resources and management, as well as on the overall performance of the organization. In general, SISP has seven major objectives (Fidler and Rogerson, 1996). These are:

- to improve communication with users
- increase management support
- improve resource requirements forecasting
- determine more opportunities for improving information systems provision
- identify new applications which provided a greater return on investment
- develop an organizational information system architecture
- identify strategic information system applications

2.8 OVERVIEW OF STRATEGIC INFORMATION SYSTEM PLANNING ACTIVITIES

The specific nature of activities in strategic information system planning exercise will vary depending on the approach adopted, and the support offered by appropriate methodologies and techniques. However, Fidler and Rogerson (1996) have identified, in general terms, the main components of a SISP processes and how these are related. The main components of SISP comprise:

- Defining the scope of the SISP exercise—obtaining authorization, establish team, create time table, and allocate responsibilities.
- Understanding and interpreting the business requirements—establishing the corporate strategy and corporate critical success factors, review existing IS/IT strategy, identifying potential IS/IT applications.
- Defining the organizational information needs and the underpinning systems architecture—establishing the ideal solution.
- Formulating the information, information systems and information technology strategies—deriving these in order though interactively.
- Presenting the final output to the client—deliverables are predetermined in the exercise scope.

Strategic information system planning exercise is not a one time exercise. Within a single exercise there will be several iterations some of which might include a feedback in to the organizational strategy resulting in a change in the overall organizational direction and therefore leading to a change in the scope of the SISP exercise in hand (Fidler and Rogerson, 1996).

2.9 A GENERAL PLANNING MODEL

A structured model of the strategic planning process is helpful in describing the manner in which the activities of information systems development can be aligned to the overall organizational objectives. A very general strategic model is suggested by Willcocks (1994). This model integrates the status of the information technology division with the present business policies and operations. It also depicts the link between the organizational long term strategy and goals; and future information technology support systems.

2.10 STRATEGIC INFORMATION SYSTEM PLANNING APPROACHES

There are various approaches or methodologies that are used in the strategic information system planning activities. These include Stages of Growth, Competitive Strategy, Critical Success Factors (CSF), Business Systems Planning (BSP), Investment Strategy Analysis, the Scenario Approach to Planning, the Architecture building Approach, the Anderson Planning Approach, Customer Resource Life Cycle, Ends/Means Analysis, etc. (Mcnurlin and Sprague, 1989; Fidler and Rogerson, 1996; Turban, McLean and Wetherbe, 1996).

Classifying and applying a strategic information system planning methodology depends on measuring the methodology from three perspectives: the ease of use of the methodology; the scope of the methodology; and the orientation of the methodology (Fidler and rogerson, 1996).

- Ease of Use—relates to the relative difficulty or complexity of applying the methodology to a given situation. A methodology of low complexity is considered easy to use.
- Scope—refers to classifying a strategic information system methodology on the extent to which it covers the whole planning process. Some methodologies provide more techniques covering more aspects of the planning process than others.
- Orientation—refers to the strategic information system planning approach to identifying areas of information system investment. Approaches vary between a predominantly data-driven approach such as Business Systems Planning (BSP) and a predominantly business objective-focused approach, such as Critical Success Factors (CSF).

Furthermore, some methodologies are more applicable for the business sector (such as the competitive strategy) than for the service giving organizations. As far as this research is concerned, because of its ease of use and its business objective-focused approach, the critical success factor approach is employed.

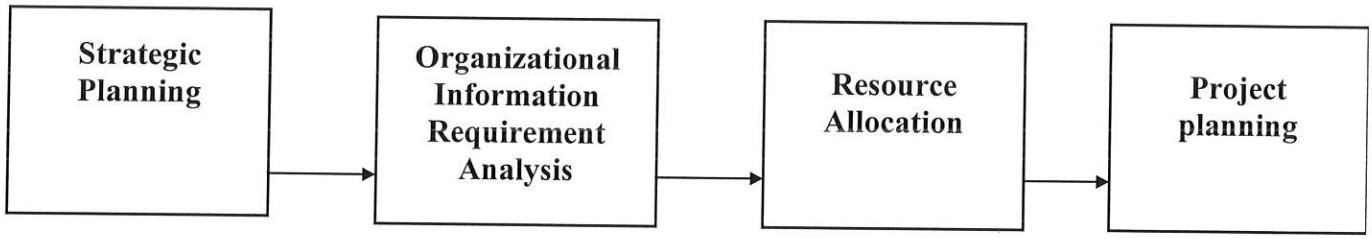


Fig. 2.4 Basic four stage model of information system planning ***(Turban, McLean and Wetherbe, Information Technology for Management: Improving Quality and Productivity. John Wiley and Sons Inc., 1996***

Generally, this research employed a generic information systems planning model called the 'four stage model of planning' which has been formulated by Turban, McLean and Wetherbe (1996) on the basis of observation of planning efforts, promotional literature and analysis of the methodologies in the planning process.

Each of these stages will serve as criteria to assess and analyze the existing and future information systems situation in the University under consideration and will be discussed in detail in the succeeding chapter.

CHAPTER THREE

PRESENTATION AND ANALYSIS OF DATA

3.1 STRATEGIC INFORMATION SYSTEM PLANNING IN ADDIS ABABA UNIVERSITY

As it is presented at the end of the previous chapter the general information system plan consists of four major stages, the first of which is strategic planning. At this stage, there is a need to think the information system in strategic terms in the sense that the suggested information system or information strategy will be aligned with the overall organizational objectives and strategies. In order to accomplish this, the organization is expected to do the following.

- set the information system mission
- Assess the environment
- Asses organizational objectives
- Set information system policies, objectives and strategies

The output of all these processes and activities is expected to include a new or revised information charter, and assessment of the information system function; an accurate perception of the strategic operations and perceptions and directions of the organization; and a statement of policies, objectives and strategies for the information system effort.

3.1.1 Information System Mission

At the stage of information system mission statement the organization should produce a charter that guides the entire activity in the development and use of information system.

Currently, even though, Addis Ababa University is working on networking activities, there is no well structured and clearly stated mission of information system. What is expected at this time is a clearly stated mission and strategy that helps to coordinate the various information system/ technology related activities and to integrate the information system strategy with the organizational strategy.

The major objective of the networking activity is to facilitate communication between the various campuses of the University. The absence of information system plan complicates the use of information technology and other related facilities in the University. The lack of information system plan has practically created problems on the performance of the committee that is working on the grand university wide network. The report of the committee indicates that the unavailability of a formal information system/technology plan to be used as a guide was one of the major limitations that it encountered. There is no formal and approved plan to base IT strategy upon.

In relation to the training of the academic staff and the offering of information technology related courses for the students in the University, the Academic Programs Officer has some reservations. Even though it is thought about, the University has not yet identified how and where to start the training of the academic staff so that the staff will get the benefits of IT. Courses are not also going to be offered to all students in all fields of study of the University; rather it will be offered to students of some departments where graduates need to have at least introductory skill and knowledge in the use of information technology. The reason for this is the absence of sufficient human and material resources, facilities and lack of efficient use of the available facilities.

The absence of the necessary IS/IT plan is also a hindrance in the acquisition of computers and other related materials. According to the grievance of around eight contacted departments and the view of the Academic Programs Officer, the situation in the University regarding the acquisition of materials is highly "purchase-dictated" in that necessary materials are not purchased according to specifications made by the requesting department. Furthermore, there are computers and related materials that are acquired in the form of donations on which the University may not have any control—being a receiver.

3.2 DESCRIPTION OF THE EXISTING INFORMATION SYSTEM SITUATION IN THE UNIVERSITY

3.2.1 Computers in the Various sub units of the University

With regard to computerization, currently there are more than 530 personal computers in the various colleges, faculties, schools, institutes and administrative offices of Addis Ababa University which are very diverse in facilities (Report on Networking Needs of Addis Ababa University, 1998). These personal computers are used for different purposes in the various offices according to the specific processing needs of each unit. According to the report, large proportion of these PC's are used as stand alone systems to provide access to word processing under either MS word or word perfect.

There are also some academic and research units that are using rudimentary Local Area Networks to support their research and academic activities. Some faculties are also using the information technology as a delivery vehicle for their curriculum. These include Faculty of Technology, School of Information Studies for Africa (SISA), Faculty of Science and Faculty of Business and Economics. Institute of Development Research (IDR) and the Kennedy

Library also have their own computer centers. Faculty of Education has recently acquired more than thirty Pentium computers of which twenty are being used for teaching purpose in the undergraduate program of the Department of Business Education. These computers are also working on stand-alone basis which has its own drawbacks in such an application.

Currently, there is sign of improvement in the use of IT in some of the aforementioned departments. The school of information Studies for Africa (SISA) is planning to set up an Internet unit in its computer laboratory to provide browsing facility and training to users on the use and application of Internet. The Faculty of Technology and Department of Mathematics (in the Faculty of Science) are working on upgrading their computer labs in to full-fledged LAN's. The University Library is also working on upgrading its computer center in to a full-fledged information center and is trying to establish a resource sharing network of the libraries.

Regarding Internet services, almost all faculties and research institutes have Internet connectivity. Large number of faculties, schools and research institutes provide access to Internet for their staff. These include School of Information Studies for Africa, Faculty of Business and Economics, Institute of Educational Research, Faculty of Science, Institute of Development Research. In some faculties however, the connectivity is only to the Dean's office with no service to their academic staff. All these indicate independent efforts of some faculties schools and research institutes to integrate information technology to support their major activities and to better achieve their objectives.

3.2.2 The University Computer Center

Addis Ababa University established the System Design and Data Processing Center in the beginning of 1980's. The driving force for the establishment of the center was "the increasing complexity of operations carried out by the University and the resultant increase in the number of sub units and staff which called for a means for coordination and control" (Computerization needs of Addis Ababa University, n.d.)

The objectives of the System Design and Data Processing Center were to review the management system and to suggest possible ways to minimize wastage, delays and uncertainty for the betterment of control and communication. Specific objectives include

- centralized business systems and data processing cervices
- organizational systems analysis
- work simplification and measurement
- office equipment and evaluation
- forms design and control
- computer hardware and software evaluation in the University
- programming, documentation and data control
- training in electronic data processing systems
- providing data processing and information services

In general the computer center was expected to improve the performance of the various components of the University by supporting them in the integration and use of information technology tools. The center was established in such a way that its head (director) reports to the Vice President for Business and Development who is in charge of all administrative activities in the University.

3.2.2.1 Resources of Systems Design and Data Processing Center

Currently, the Systems Design and Data Processing Center has

- one NCRV-8568 model main frame computer that was bought in September 1982. This computer has the capacity of supporting twenty terminals. It is equipped with supporting accessories such as six disk drives with 200 MB each (removable disks), two tape-reel units, two cassette units, two printers (with the capacity of 200 lpm and 600 lpm) and 15 terminals.
- six personal computers; five of which are 386DX PC's with 8MB RAM and 130MB disk storage space. The sixth PC is $486DX_2$ model with 16MB RAM and 500MB hard disk space. The PC's run DOS, word processing software, spreadsheet, and database application packages.

In terms of human resources, even if the structure of the center reflects twenty-one line posts only seven are currently staffed. The center has four computer programmers, one systems analyst, two systems operators, two data entry personnel and one secretary (Report on the Networking Needs of Addis Ababa University). As the report indicates, currently it appeared very difficult for the center to provide basic services for the University community. This is due to the very old technology that the system applies, the absence of sufficient skilled manpower in the center, etc.

3.2.2.2 Services Offered by the Systems Development and Data Processing Center

The Systems Design and Data Processing Center currently provides the following services to the various units of the University

- Supporting research activities by providing machine time service and data processing assistance to staff members, graduate and undergraduate students.

- Training staff members on computer programming and word processing.
- Installing application software to various departments and maintaining upon request.
- Assisting the finance division and the personnel department by developing programs that support their activities even though it is not up to the expectation.
- Maintenance of both hardware and software for requesting departments.

3.2.2.3 Running Costs of the Center

The mainframe computer has been purchased for birr 600,000 and because of additional peripherals the cost has exceeded over birr 1,000,000. The room for the mainframe has to be air-conditioned and this by itself has additional costs. The annual maintenance cost of the system is birr 166,000. The annual salary of the personnel in the center reaches birr 63,492 and consumables are estimated to cost over 6,000 birr annually.

3.2.2.4 Problems Related to the Existing Computer Center

SDDPC has not been performing up to its stated objectives. In fact, one of the major objectives of the committee that worked on the computerization needs of the University (which was set up by the president) was to evaluate the performance of the center. The study indicates that nearly half of the ninety-four academic and administrative departments of the University indicated that they even did not know about the existence of such a center in the University. The report states that "despite SDDPC's long existence however, no administrative unit, not event the central administration is provided with on-line access facilities to any data maintained by the center in respect of the automated applications". In general the major problems of the Systems Design and Data Processing Center are summarized as follows.

- The system has major compatibility problems with the modern technology
- The operating system that the center uses is no more supported
- The system has a major maintenance problem because it is obsolete. Parts are no more available.
- The systems supports only a maximum of twenty terminals and this capacity has already been saturated.

According to the response of the Academic Programs Officer, the center is by no means performing satisfactorily. The information needs of the top management still remains unmet.

3.3 CURRENT APPLICATIONS AND FUTURE OPPORTUNITIES OF INFORMATION SYSTEM IN THE UNIVERSITY

As it was mentioned earlier, currently most computers in the University are used for word processing purposes and other simple applications. With regard to the current unsatisfactory situation of information technology in Addis Ababa University, the committee that worked on the networking activity of the University concludes its finding as follows:

> - - - it seems IT has failed to entrench itself on any applicable scale in AAU. In particular, the current position of the utilization of IT to support the administration (i.e., such applications as finance, personnel, students records, etc.)is very poor, if not absent, Most of the administrative activities are done manually. Information records are stored in such manual filing systems as drawers, lateral filing cabinets, and suspension files. Much of the interoffice communication is usually handled either by telephone or through postal mail.

One positive step the University is now taking is the networking activity which is still underway to connect the various campuses of the University. This is expected to improve the efficiency of stand-alone computers used in the various offices and facilitates communication

and information and resource sharing situations. At present, the activities in most offices are supported by word processing packages. However, there is no formally organized computerized information system; be it transaction processing, management information, decision support or any other that would support the teaching, research and management activities in the University.

The Academic Programs Officer was asked to identify the major ones among the suggested inhibitors for having information system/ information technology strategy. He pointed out seven basic reasons that hampered the development of this strategy. These are

- other priorities being more important
- budgeting constraints
- the concept information system/information technology has been perceived low by the University administrators
- lack of appropriate planning for information system/information technology
- lack of organizational/top management support
- lack of appropriate technical support staff in sufficient number
- absence of competition among universities and colleges in the country

He further added the absence of optimum use of available material and human resource in the University.

With regard to human resource, there are well trained academic staff in the various departments of the University like School of Information Studies for Africa, Computer Science, Electrical Engineering, Library Science, University Libraries, and in some other departments. The table below shows number of academic staff with at least B. Sc. Degree in either Computer Science, Information Science or Electrical Engineering in academic departments and in the different branches of the University Libraries.

Table 3.1 Number of academic staff with at least B. Sc. Degree in either Information Science, Computer Science or Electrical Engineering

Department	Ph. D.	M. Sc.	B. Sc.	Total
SISA	--	8	--	8
Computer Science	3	1	3	7
Library Science	--	4	--	4
University Libraries	1	7	--	8
FBE	--	2	--	2
Electrical Engineering	4	3	5	12
Total	8	25	8	41

All these people are members of the academic staff who are busy in their academic career. However, even though it appears difficult to assign most of these staff members as systems personnel, they can serve as initiators in the form of steering committee members which can be in charge of identifying problems and suggesting possible solutions together with facilitating and supervising the procedures involved in the development of the information system. Two academic staff members in the Electrical Engineering Department have their M. Sc. degree in Software Engineering. Once the information system is established, it needs to have its own necessary qualified staff.

3.4 ORGANIZATIONAL AND INFORMATION SYSTEM OBJECTIVES AND STRATEGIES

As it was stated earlier, the objective of Addis Ababa University is to advance science and technology in the country, to conduct applicable research geared towards solving development

problems, impart knowledge through research and to satisfy the manpower needs of the country.

Although efforts have been made to identify the strategic organizational plan of the University, the researcher couldn't find any written and well stated strategic plan of the University. As an alternative approach related questions were included in the interview guide given to the Academic Programs Officer and he indicated some of the future plans of the University.

Accordingly, in the coming one or two year(s) all academic departments in the University will review their curriculum as a result of the self and external assessment that has been conducted in 1997/98 academic year. Every department will assess the demand for its graduates in the work environment. This will also help the departments in particular and the University in general to be in line with the new educational and training policy of the country. All research institutes will also reorganize themselves in accordance with the criteria provided to them by the University to gear research activities towards solving practical problems in the society. The third major issue in the University in the succeeding years is the implementation of its own charter which leads to full autonomy for its internal activities.

The major objective of this plan is to improve academic activities and to better address the demands of all kinds of users (be it governmental or private organizations, students, etc.). In the long run, the University plans to further improve its educational activities and also to contribute its share to the improvement of education in the country. It also intends to revise its curriculum every five years on the basis of the response of graduates and employers; about their fitness to the work environment and their demand for skilled labor, respectively.

3.4.1 Critical Success Factors of the University

The critical success factors approach is developed as a way of investigating the information requirements of executives within organizations. Critical success factors are the key activities in an organization in which performance must be satisfactory if the business is to survive and flourish. This approach is popularly used in information systems strategy development due to its intrinsic conceptual simplicity. In general critical success factors are key areas of activity in which favorable results are absolutely necessary for organizational goals to be realized. Critical success factors vary among industries and even for individual segments within a particular organization.

Steps used in the Critical Success Factor Approach

The steps used in the application of this approach in this paper are adapted from Turban, McLean and Wetherbe (1996). These steps are widely used in the identification of the critical success factors of any organization and they consist of:

1. Identification of the objectives that are central to the organization.
2. Determining the critical success factors that are essential to meeting the stated objectives.
3. Identification of the decisions or actions that are keys to these critical success factors.
4. Determining the variables that underlie these decisions and looking for ways by which they can be measured.
5. Identifying the information systems that can supply these measures.

Therefore, the critical success factors of the University, which are identified by examining its stated objectives and by consulting the Academic Programs Officer include the following.

Human Resource. Having highly skilled and innovative human resource who can actively handle the teaching, research, and administrative activities is essential. This resource is central to all other material and information resources because of the nature of the organization itself. "If there is any thing the University is to be proud of it is not its building, neither is its technology. It is its human resource. Yet, the Addis Ababa University's academic staff is characterized by underdeveloped young persons waiting for higher learning opportunities" (Study Proposal for the Internal Reorganization of the Addis Ababa University, June 1997).

Teaching. This is the primary objective for which the University itself is originally established. The outputs (graduates) are results of quality teaching and learning processes. Therefore, the efficiency and smooth running of these processes is not an option, rather a necessity. The factors that determine the quality of these processes include: availability of sufficient qualified teaching staff, facilities like classrooms, books, libraries, and other necessary materials; standardization of the curriculum, etc.

Student Academic Records. This is also a very vital segment of Addis Ababa University that needs special attention. The activities in this section include the admission and registration of students, updating their records at the end of every semester, providing necessary credentials such as issuing degrees, diplomas and certificates, etc. Currently, however, all these activities and processes are handled manually despite the increase in the number of students and the intensification of problems related to the office every year.

Because of the nature of the records, no student's record is discarded from this office because of any reason, that is, records related to students are permanent. This aggravates the burden of the office. According to the Academic Programs Officer and the Associate Registrar, the University Registrar's office is the key area that needs to be automated first.

Students Administration. This includes the provision of residential rooms, food, medical facilities, and other related matters that need to be fulfilled before the actual teaching and learning process. Some of the determining factors include availability of dormitories, medical facilities, sufficient funds for food items, etc.

Academic Information Resources. Included here are the libraries and other information services. The teaching and learning situation will be incomplete without the support from the academic information resource in providing current and related materials for each field of study and subject. All of the subsections of the library system need to be efficient enough to provide necessary material and information including document delivery and Internet services to staff members and students. The current library system, however, is primarily manual. In fact, it provides limited document delivery services to staff members and graduate program students. For the purpose of improving the efficiency of the library system and to better serve the students, academic and administrative staff, researchers and other users, it needs to be automated by introducing on-line public access catalog and other necessary programs. Since library is one of the major segments of academic institutions, its effective and efficient performance is mandatory.

Research. Research is also of the major activities expected of higher academic institutions. The recent nature and practicality of research undertakings to solve societal and community

problems is of vital importance for the University. One of the major inputs of any research undertaking is current, dependable and relevant information.

Finance. Finance is considered to be the center of all activities in any organization which also applies for the University under consideration. In the absence of financial resource employing qualified teachers and researchers will be difficult, if not impossible; purchase of books and other necessary materials can also be unthinkable; providing food and other facilities for the students can't be achieved; etc. Once the money is made available there is also the need for wise use and proper control which again calls for proper financial information system.

3.5 ORGANIZATIONAL INFORMATION REQUIREMENT AT THE TOP MANAGEMENT LEVEL

Analysis of organizational information requirements involves a series of steps of which defining the underlying organizational processes is the first one. An organizational process is the fundamental organizational activity necessary for the operation of the organization. The major organizational processes are identified by analyzing the objectives of the organization and conducting a series of discussions with the concerned managers. The major processes of Addis Ababa University are

- Curriculum
- Academic programs
- Research
- Degrees, Diplomas, etc.
- Teaching Standards
- Academic Records
- Budget
- Personnel
- Audit
- Public Relations

- Grading Policies
- Materials Management
- Academic Staff
- Students Academic Affairs
- Library System
- Student Service
- Legal
- Finance

Planning

Evaluation

Reporting (General)

Materials & Supplies

Inspection

Revenue Generation

Engineering & Main.

These organizational processes are obtained from the job descriptions of each office at the top management level and the major subsections, and from the repeated discussion made with the Academic Programs Officer.

The next step is developing a subsystem matrix. Once the underlying organizational processes are defined, the next phase is to relate organizational processes to specific managers in which case the resulting document will be a manager by process matrix. In this case the processes will be those that are identified in step one of the organizational information requirements analysis process. This matrix indicates the managers who have major decision making responsibilities for each specific process. Personnel or organizational changes can also be easily adjusted to the matrix. The process by manager matrix of the University can be represented as shown in Table 3.2 on page 64.

Table 3.2 Managers-by Organizational Processes Matrix

Organizational Processes	Top Mangers of the University			
	Academic Programs Officer	Academic Vice President	Vice President for Business and Dev't.	President
Curriculum	X	X		
Academic Programs	X	X		
Academic Staff	X	X		X
Student Services			X	
Students Academic Affairs	X	X		
Planning (general)				X
Overall control				X
External Relations				X
Audit				X
Personnel			X	
Materials and Supplies			X	
Library System		X		
Legal			X	
Academic Records	X	X		
Revenue Generation			X	
Engineering and Maintenance			X	
Research		X		
Teaching Standards	X	X		
Budget			X	
Degrees, Diplomas, etc.	X	X		X
Inspection			X	
Finance			X	
Grading System	X	X		
Overall Reporting				X

Table 3.3 Information Categories by Organizational Processes Matrix

	Information Categories																								
Organizational Processes	Approved Coures	Graduation Requirement	Contract	Teaching load	Academic Staff list	Dormitories	Number of students	Student performance	External policies	Administrative Staff	Training policy	Complaint	Inventory	Requests	Library information	Budget	Expenditure	Research information	Grading policies	Class rooms	Graduates	Educational policies	Graduates employment	Employers information
Curriculum	X	X							X					X	X				X			X	X	X
Academic Programs	X	X	X	X	X		X		X			X		X	X	X	X	X	X	X		X	X	X
Academic Staff			X	X							X	X		X		X	X	X				X		
Student Services						X	X	X				X	X	X	X	X	X							
Students Academic Affairs	X	X						X				X												
Planning (general)			X	X	X	X	X	X	X	X	X		X	X	X	X	X	X			X	X	X	X
Overall control	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X			X			
External Relations					X		X		X	X				X	X			X	X			X		X
Audit														X										
Personnel			X	X	X				X	X	X	X		X		X	X							
Materials and Supplies			X		X		X		X			X	X	X		X	X							
Library System							X			X		X	X	X	X	X	X							
Legal			X	X	X				X			X				X	X							
Academic Records	X	X					X	X		X			X			X	X		X	X	X			
Revenue Generation			X				X			X		X	X	X		X	X	X						
Engineering and Maintenance			X			X			X	X		X	X	X		X	X							
Research			X	X										X	X	X	X	X				X		
Teaching Standards	X			X	X							X			X					X	X	X	X	X
Budget									X	X	X		X	X	X	X								
Degrees, Diplomas, etc.	X							X	X					X		X					X			
Inspection						X							X	X		X	X							
Finance			X						X	X		X		X		X	X							
Grading System	X	X																	X					
Overall Reporting	X	X	X	X	X	X	X	X		X					X	X	X	X		X	X			

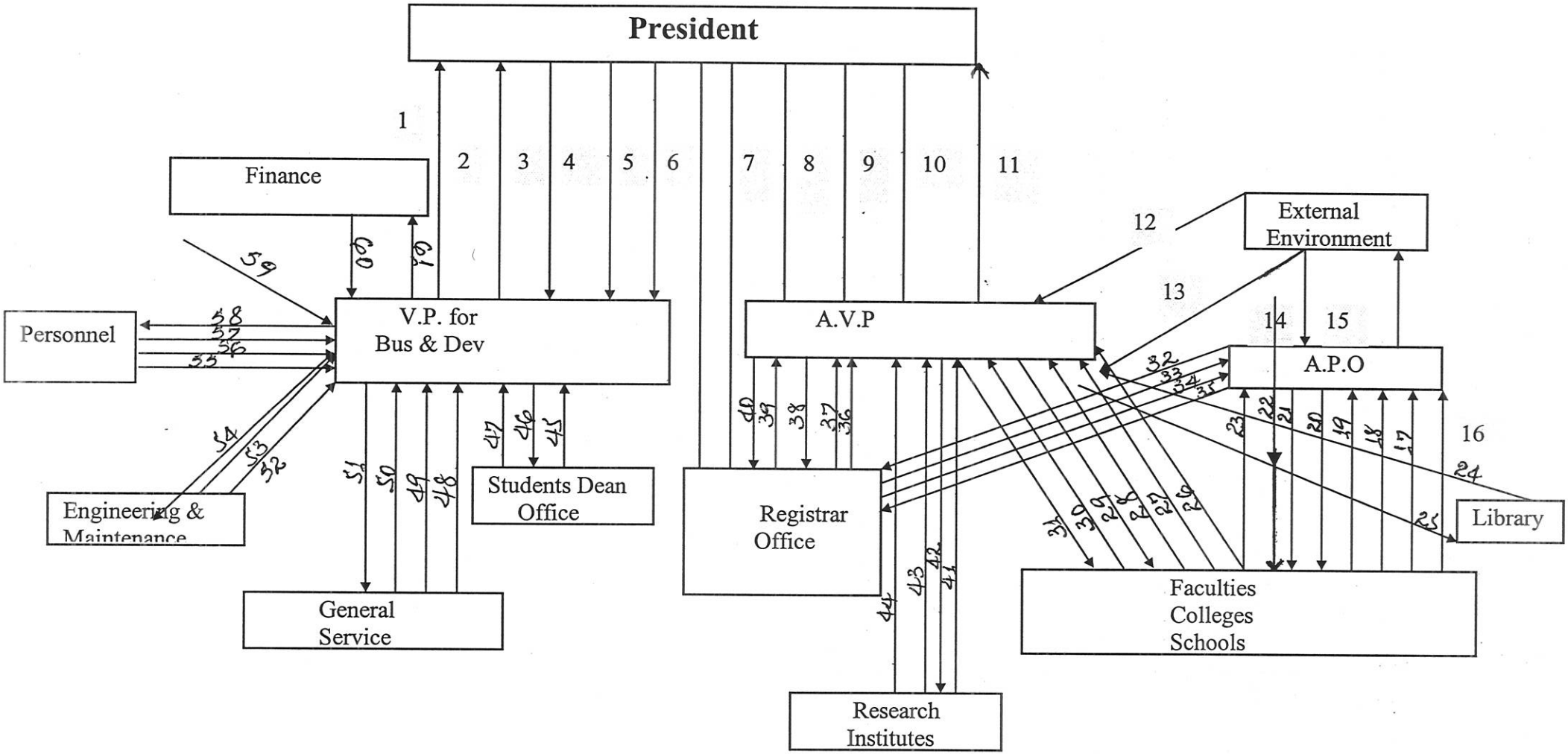


Fig. 3.1 Inflow and Outflow of Information to and from the offices of the Top Managers of the University

Key

1. personnel information
2. Financial (Budget) Report
3. Approved budgets
4. Guidelines
5. Other Responses
6. Degrees, Diploma's for signature
7. Signed Degrees and Diplomas
8. Academic Staff Cases
9. Budgetary cases
10. Replies
11. Programs
12. Environmental information
13. Release of internal information
14. Educational policies
15. Programs information
16. Course Approval Request
17. Curriculum cases
18. Staff Cases
19. Student Cases
20. Approved Courses
21. Directions
22. Request Responses
23. Performance Reports
24. Budget Cases
25. Responses
26. Employment request
27. Performance report
28. Staff cases (promotion, scholarship, etc.)
29. Guidelines
30. Curriculum cases
31. Responses
32. Student Cases(to Registrar)
33. Enrollments Reports
34. Classroom usage
35. Graduates Report
36. Enrollment report
37. Resource usage
38. Schedules
39. Prospective Graduates
40. Responses
41. Budget request and funding
42. Directions
43. General information
44. Reports
45. Facilities usage
46. Instructions
47. Budget Request

48. Transportation cases
49. Purchasing
50. Property & Store
51. Replies
52. Priorities of construction
53. Budgets
54. Directions
55. Employment cases
56. Training & promotion
57. Reports
58. Instructions
59. Budgeting
60. Financial Reports
61. Guidelines

CHAPTER FOUR

PROPOSED INFORMATION SYSTEM STRATEGY AND ITS IMPLEMENTATION

4.1 STRUCTURE OF THE PROPOSED INFORMATION SYSTEM

Because of the increase in the complexity of its management, the University is working on decentralization of decision making. For example, the each faculty or college is becoming an independent budget center for its own operations. Therefore, the relationship between the various units and their communication with the central administration can best be facilitated by the use of well organized information system.

On the basis of the findings observed and the nature of the organizational activities the information system plan of the University or its general information system architecture is suggested to be organized on hierarchical basis. That is, some units will have transaction processing systems and management information systems at the same time. The others will have only management information systems, and still others will have decision support systems. By hierarchical it means that the lower level systems will supply necessary information for the higher level systems which finally reaches the central administration.

This is done by observing the nature of activities the units are expected to perform every time. Accordingly it is suggested in this paper that:

- Faculty records offices need to have transaction processing systems since they deal with students academic records including registration, updating files, and report generation like grade reports for the students.
- Deans' offices need to have management information systems since they deal with managerial issues regarding faculty affairs like student cases, staff cases, departmental performances, and other administrative issues. Deans are at the middle management levels and they make functional decisions. Therefore, they need reports from the respective academic departments. In addition these offices also gather information from records divisions. Hence management information system will serve better for these offices.
- Registrar office need to have both transaction processing and management information systems. The transaction processing system will handle the
    - ♦ students selection
    - ♦ students registration
    - ♦ updating student records (at the end of every semester), etc.

Where as the management information system generates consolidated information in the form of reports such as

- ♦ student enrollment by department, by sex, by year, etc.
- ♦ classroom usage
- ♦ number of graduates by level, by department, by sex, etc.
- ♦ Usage of material resources in the office, etc.

And also used for managing the administrative affairs of the office

- Financial service department should also have both transaction processing and management information systems for handling income and expense transactions, and financial management issues respectively.
- Personnel department can have only management information system since it does not deal with routine and daily transactions.
- The Dean of students' office should also have management information system to deal with materials, items and students placement to the various residential blocks.
- The library system should work towards automating its entire activities. The automation of the libraries can serve the following purposes
    - ♦ providing efficient services to their users in their respective buildings
    - ♦ providing resources available to user departments, staff and researchers through the university wide network
    - ♦ providing Internet services to students, researchers and academic staff
    - ♦ better control and management of the library system
    - ♦ easily connect and communicate with other libraries in the country and overseas, etc.
- Research institutes need to have management information system to coordinate and manage their research activities and all should be connected to the university wide network and to the Internet to easily access information and to disseminate their research outcomes widely as necessary. They should also be able to provide Internet services to their researcher staff. It will also be better if they subscribe to databases of other foreign universities and research institutes.

All these systems are expected to report to higher level information systems at the top management level. The information system for the top administration of the University can

be organized in the existing computer center. This computer center will be organized in such a way that it will be a full-fledged information system department of the University. The new information system department when properly organized serves the following fundamental purposes.

1. It houses the information system for top managers (central administration) of the University. The information system for this group of managers will consist of decision support systems that is used to support both semi-structured and unstructured decisions making processes. The information sources (inputs) of the decision support system will be, on the one hand, the various management information and transaction processing systems established in all faculties, administrative units and library systems. In other words, all lower level information systems are connected to and will supply information to the central information system department. In fact, they provide only necessary information. On the other hand, the decision support system also gathers information from the environment which is external to the University.
2. It evaluates the existing (working) systems in different segments of the University, suggests possible changes to the better and develops necessary systems and programs. It also specifies and ensures the availability of necessary hardware and software facilities to the suggested systems. It performs these functions on priority basis depending on the urgency of the problem in a given unit.
3. It serves as the center of the University wide network and it also works towards the improvement and upgrading of information systems in the in the various campuses and functional areas in particular and the University in general. That is, it serve a s a central unit for information planning and support of the University
4. It controls standardization and integrated information related activities in the University.

5. It provides the necessary training for staff members to make them aware about the benefits of information technology in the teaching and learning environment.
6. It enhances the use of information technology in delivering subject matters—facilitating computer assisted instruction.

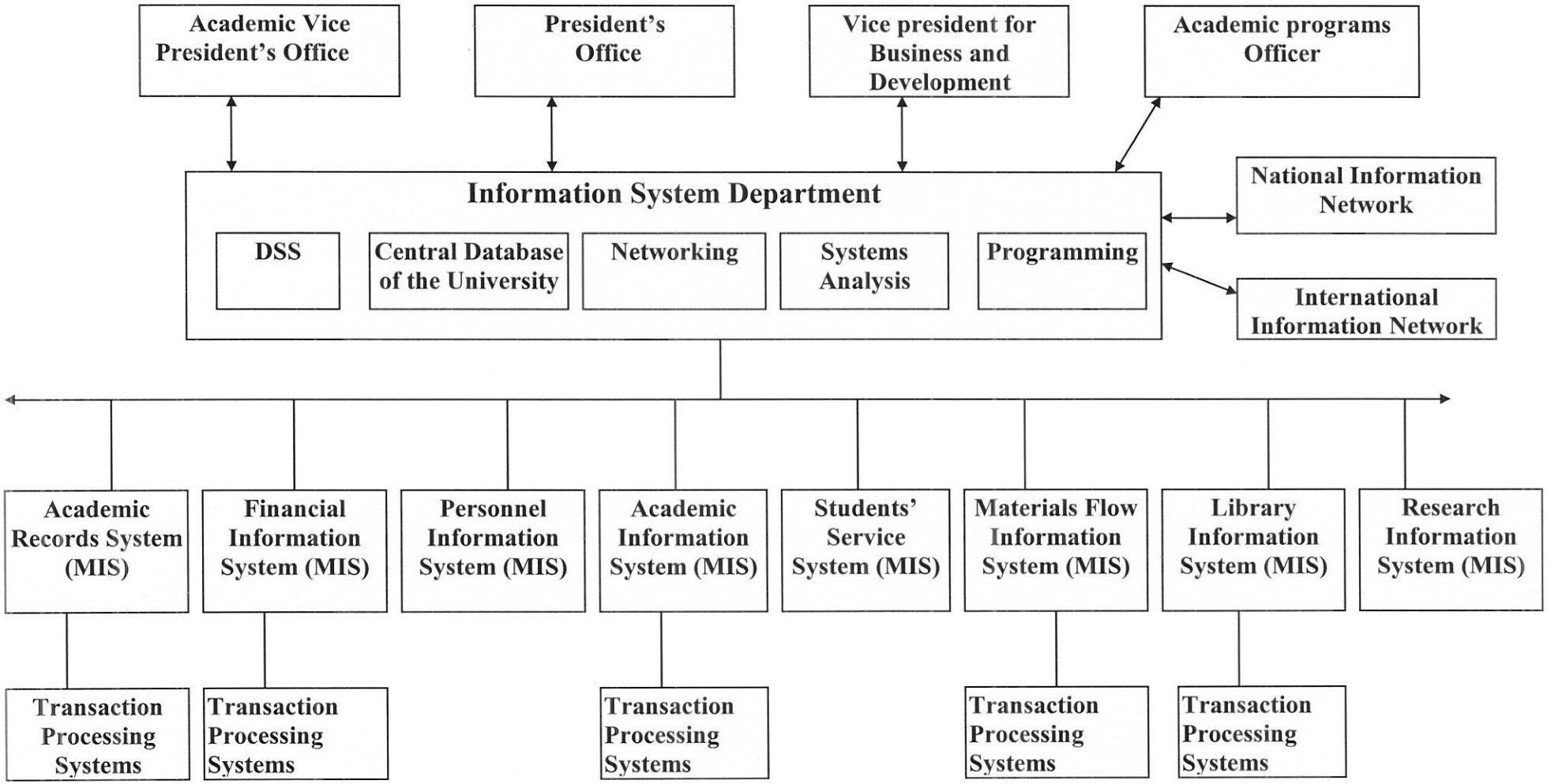


Fig. 4.2 The Proposed Information System Architecture of Addis Ababa University

4.2 PRIORITIES FOR IMPLEMENTATION

Whatever attempt is made to work out the information system plan or strategy of the University, it will be very difficult to implement all phases of the information system project at one time. Therefore, there is a need to prioritize information system development activities. The priority can be done on the basis of a given criteria some of which are

- seriousness of the problem in the unit
- ease of development and implementation
- predefined nature of the structure of the project
- size of the project
- user proficiency, etc.

When these issues are considered in the context of the University under consideration, the registrar office is the section that needs urgent attention. The reasons for this is that

a. its activities are highly predefined in that there are specific conditions for admission, registration, promotion, graduation, etc. Furthermore, its activities are routine and repetitive in nature that can easily be supported by computer/information technology. This leads to ease of development and implementation.

b. the problems of the office are very serious in that both internal and external users including the central administration of the University complain about the services it offers.

Therefore, it is possible to start with transaction processing systems together with the creation of the database for the office. Faculty record offices are the major sources of information for the registrar office. Hence, there is a need to computerize the faculty record offices to let them share information with the registrar office. The next project can be automation of the

various functional areas and the development of central information system department. In fact it is also possible to start from the top (central information system department), however, the central department gathers information from the lower level systems and summarize the information for decision making. In addition, it will be easy to start from the bottom by solving practical and immediate problems.

4.3 RESOURCE ALLOCATION

Most of the administrative and academic units have personal computers. In general as it was mentioned in chapter one the University has more than 530 computers. The availability of these computers will significantly minimize the initial development cost of the information system. It is true that the decision to purchase new hardware or not depends on the capacity of the already available computers and the requirements of the suggested system. But there are powerful computers which are currently in use for word processing purposes. Furthermore, there are already recommended hardware and software facilities for the grand networking project that is undergoing. Hence, even though it is difficult to specify the needed facilities at this stage, the proposed project will not be as much difficult as starting the project from the scratch. Therefore, depending on the specific system study for each segment, it will be easy to decide on the needed facilities.

As far as the running cost of the information system department is concerned, it can use the charge-out system. Fee schedules can be developed for each unit of service (maintenance, installation, consultation, etc.) which has the objective of at least partially recovering information system expenditures. User departments will be charged for the services they are rendered. In the mean time, this approach helps make the users responsible for the cost of their information systems and for greater planning and control of the systems.

The central information system department can prepare and distribute guidelines, procedures, and schedules to specifically direct planning efforts. However, planning and decision making will be left for user departments with proper control to avoid integration problem when it affects multiple users and departments. This is to minimize or eliminate problems of information sharing processes.

4.3.1 Human Resource Requirement

When information system is thought about for any organization one of the issue to be considered is the human resource aspect—training of the employees and/or employment of new workers. In all functional areas the workers need to be trained to acquaint them with the newly developed system. The internal users of the system who perform the daily operations of the office have their own knowledge about the job to done, what they need is the skill in the operation of computers (the technology).

In case of system failure or when users in the various offices face any kind of difficulty in making use of the system they consult (report to) the information system department to get the necessary support and maintenance. However, the information system department needs to have the necessary skilled personnel in all areas of its sub units (systems development, networking, programming, etc.). It should also have electrical or computer engineers who can be in charge of the hardware maintenance.

4.4 APPLICABILITY

Mostly the applicability of a given project is studied by evaluating it from three perspectives: technical, economic and operational. In the case of technical feasibility the objective is to

check whether the existing technology solves the problem of the organization. In this regard, the increase in the technological advancement is promising and even the technology remains as it is, the University has a lot to benefit from the existing technology. This is so because the University is highly lagging in terms of the application or integration of the technology to its strategy and performance. The problem is lack of awareness about the benefit gained from information technology, not the limitations of the technology itself. The availability of good number of technical personnel in the University who can actively participate in the project is also an advantage.

Economic feasibility deals with the cost effectiveness of the existing technology. Although it was not possible to work out the cost-benefit analysis it is evidenced that the University has many computers currently which in effect minimizes the cost of information system development. Moreover, the price of computers and related materials is decreasing at high rate annually. The part of the proposed information system that requires large investment is the central information system department since the existing facilities are very old to be used for the new system.

Operational applicability tries to justify whether the solution works with this kind of organization if implemented. The operational feasibility can be justified by analyzing the kind of activity the organization performs and by taking the experience of other similar institutions. Therefore, the management and academic activities of the University are not different from the processes of other organizations in that its activities can be supported very well by information technology..

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

One of the objectives of this study was to identify the factors that inhibited the establishment/development of information system strategy in Addis Ababa University. It was also intended to identify the flow of information in the offices of the top managers and to suggest strategic information system that can be in place to support their decision making activities.

In order to achieve these objectives major problems addressing the status of information system application in the University were stated in chapter one (statement of the problem section) which were identified through a preliminary survey. As a means of fact finding interview guides were prepared and presented to the Academic Programs Officer of the University. Related internal documents including the University's Senate Legislation were studied and analyzed. Being a staff member of the University, the researcher has also some practical observation and experience regarding the use of computers in various academic and administrative offices.

The major subjects of the study were the decision making processes of the top management including their information requirements, the performance of the systems Design and Data Processing Center which has been serving as the computer center of the University, and the application of computers in Addis Ababa University. Accordingly, the following conclusions are drawn based on the findings.

1. Although the University does have large number of personal computers, most of them are used only for initial office automation purposes like word processing. These computers are acquired through independent efforts of the various segments to introduce information technology in to their departmental activities. However, because of the lack of strategic support from the top management of the University and from information professionals, the use of information technology in different sub units can't be developed to strategic applications.
2. The University computer center (SDDPC) is not properly rendering necessary services to the various academic and administrative segments of the University. In spite of its long existence as an independent center, no part of the top administration of the University has benefited from automated (computerized) services. Nor does it provide sufficient services to departments in the areas of systems improvement, academic staff training, etc. Despite its long existence,
    a. the center does not update itself in line with the continuous improvement in the information technology. For example, while the price of computer is decreasing at a very high rate the center expends huge amount of money every year to maintain the old mainframe computer.
    b. the service it renders to departments and administrative units is not up to what is expected .
    c. it does not broaden the horizon of its services to the University community. For example, the ongoing grand networking project should have been initiated by the center by observing the need for the project and for the connectivity between the various campuses of the University.

    It is evidenced that one of the major reasons for the low performance of SDDPC the shortage of skilled information and systems personnel in the center. The other one is

the backward computer technology that the center uses which in turn led to incurring large amount of money for maintenance every year.

3. It is observed that the University does not have clearly stated information system plan and strategy. The absence of IS/IT strategy led to
    - uncoordinated efforts of different departments and sub units which in turn results in difficulty of integration and coordination.
    - lack of integration of information technology to the major objectives and strategies of the organization. This again leads to wastage of financial, material and human resources.
    - under utilization of both human and material resources since they will not be used to their full potential.

Lack of organizational/top management support, budget constraints the fact that other priorities being important (such as development of its own charter and the curriculum review project) are considered to be some of the major factors which hampered the development of information system strategy in the University.

4. It is also evidenced that almost all major segments of the University are still doing their activities manually which hampered the efficiency of their performance and deters proper communication. The use of computers and other technologies for strategic purposes is not yet applied in the University.
5. It is made clear that there are skilled computer/information personnel in different faculties and departments. Their qualification ranges from B. Sc. to Ph. D. Therefore, the

University can use these people for studying the existing system and to work for better system.

5.2 RECOMMENDATIONS

On the basis of the findings presented in chapter three and the conclusions drawn, the following recommendations are made.

1. As it is indicated in the study , top management initiative and support in developing information system strategy in very limited. Therefore the top managers need to be convinced that information system /technology is one of the major resources that the university need to have to improve its objectives and to strengthen its development. Once they are convinced there is a need to take the initiative to bring necessary resources together (human, material, money) to build information system strategy.
2. The University should have information system policy that guides the purchase application and maintenance of IT tools by the various units in the university . This policy well be the major guideline from which other information related activities and objectives will branch out.
3. Qualified individuals from various faculties and units can be brought together to form a committees that works on information system strategy development. This can have two major advantages. First the University can have appropriate information strategy that is worked out by those people who very well know that internal activities of the institution. Second these people from various faculties and departments can represent their respective home departments as users of the information system and express their requirements and the flow of information in the unit. The other better approach is to form a permanent senate standing committee for information technology. The secretary of this committee

can be the director of the University information system department. This committee, will be in charge of

- acquiring hardware and software
- systems study and evaluation
- policy study and recommendation
- standardization etc.

4. The University should also coordinate the independent efforts of departments to avoid wastage of resources and enhance integration and resource sharing among the units.
5. The implementation procedure needs to be on priority basis depending on the significance of the performance of a given unit or department and the frequency of their problem. Finally, the University needs to employ more skilled information systems and computer personnel for its information system department who will be permanent staff members of the department for every necessary activity.

6. Regarding the application of computers for teaching and learning purposes, computer laboratories for academic purposes better be organized at faculty levels to offer at least introductory courses for all departments in each faculty. However, some academic departments, because of the nature of their program (curriculum) offer more courses related to information technology than others. This kind of departments need to provide full access to their students. Therefore they can organize their own laboratories on departmental basis. Some departments such as Department of mathematics, Department of Business Education, Department of Accounting, etc. have already started doing so.

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APPENDIX I

Addis Ababa University

School of Information Studies for Africa

This research is being conducted with the major objective of suggesting a Strategic Educational Management Information System for Addis Ababa University. It specifically focuses on strategic information system planning and feasibility study. Hence, this interview guide is prepared to:

- identify the major functions and strategies of the University;
- determine its current and projected organizational information requirements
- identify the critical success factors of the university
- particularly identify the information demand of the top management of the University; and
- see the flow of information.

Therefore your kind cooperation in responding to these questions is very important to the success of the research.

Thank you for your cooperation.

Regarding the University in General

1. What does the University intend to do in the coming one or two years (short term plan of the University)?

2. What are the major objectives of this plan?

3. What about its long term objectives?

4. Do these short or long term plans try to integrate information systems components to the University strategy?

5. Do you think that the Systems Design and Data Processing Center of the University (SDDPC) has been able to meet the information demand of the University community? If not, what are left unmet?

6. Is the University planning about any training program for the University staff (particularly the academic staff) to make them aware and to synchronize their capabilities with the technology possibilities? If yes, how?
7. Is the University planning to offer information technology related courses for its students?

8. Is there any policy in the University in relation to the acquisition and allocation of information technology to the various units? If no, is it planning to have such a policy?

9. Currently there is no well established computerized information system/information technology (strategy) in the University. The factors listed below are suggested to be inhibitors to having this strategy. Please prioritize these inhibitors in order of their degree of influence by writing 1 for the most inhibitor and 10 for the least inhibitor.

_____ Other priorities are more important.
_____ Budgetary constraints
_____ Lack of appropriate planning for IS/IT
_____ The concept is perceived low by the University administrators.
_____ Difficulty of assessing tangible contributions that IS/IT can make
_____ Lack of organizational/top management support
_____ High potential start up difficulties
_____ Lack of appropriate technical support staff
_____ Absence of competition among Universities and colleges
_____ The nature of the external environment is not demanding this from the university

Please list below if you think there are other inhibitors which are related to the University situation.

_____
_____
_____
_____

10. The following are considered to be very important segments in that their smooth operation is vital for the success of the University (***Critical Success Factors***). Please put (X) in front of each item either under the "agree" or "disagree" columns

	Agree	Disagree
A. Human Resource	_____	_____
B. Research	_____	_____
C. Income Generating	_____	_____
D. Finance	_____	_____
E. Teaching	_____	_____
F. Student Administration	_____	_____
G. Student Academic Records	_____	_____
H. Information Service	_____	_____
I. Consultation Service	_____	_____
J. Engineering and Maintenance	_____	_____

Please write other activities or units you think critical to the University

_____

_____

_____

Specific to your office

11. What major questions do you ask your immediate subordinates or secretaries when you are back to office after a three weeks vacation or leave from office?

12. Which of the following information categories do you consider basic for your office (for your decision making)? Please put **(X)** mark on the space provided.

_____ Number of students (by level, by program, etc.)

_____ Number of academic staff (by qualification, by faculty, etc.)

_____ Number of administrative staff

_____ Financial information

_____ Information about material resources

_____ Future (Strategic) plan of the University

_____ Information on external relations (communication)

_____ Information on educational polices of the country

_____ Information on the demand of the labor market

_____ Reports on the performance of each faculty or research institute

_____ Information about employment of graduates

_____ Information about students' and/or employee's grievance

_____ Information on consultancy/community services given t other organizations or to the community

_____Legal information

Please write if you have other information needs

_____

_____

_____

_____

_____

13. What are the sources of these information?

APPENDIX II

LIST OF OBSERVED OFFICES IN THE UNIVERSITY

Department of Business Education

Department of Technical Teachers Education

Department Educational Administration

Department of Educational Psychology

Office of the Academic Vice President

Faculty of Education, Dean's Office

Faculty of Education, Assistant Dean's Office

Faculty of Education, Extension Division

Continuing Education Division

Social Science Extension Division

Faculty of Business and Economics, Extension Division

Registrar's Office

Science Faculty, Associate Dean's Office

Institute of language Studies, Extension Division

DECLARATION

The thesis is my original work and has not been presented for any degree in any university and that all sources of material used for the thesis are duly acknowledged.

Name Engida Haileye

Signature Engida H.

Date 17 June 1999