HOW INFORMATION TECHNOLOGY CAN IMPROVE SERVICES OFFERED BY MASENO UNIVERSITY COLLEGE (MUC)

BY

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ABSTRACT

MUC lacks proper information network within and between its campuses. If a proper information network is established between the campuses, then many man-hours would be saved and utilised effectively in other sections of the University to bring about efficiency in the provision of services.

The dissertation aims at showing how IT/IS can bring about efficiency and effectiveness in MUC. Currently, the services provided are slow, inaccurate, inconsistent, lacking in integrity and laborious. A change from a purely manual system to that supported by IT/IS would bring about improvement and increase productivity.

Information has been gathered through extensive literature review. I also conducted interviews at various departments at the University of Salford to gather more information. My experience as an employee of MUC has also proved very useful for this work.

This dissertation has tried to explore the range of services that an information network can provide to an institution like MUC that has academic, administrative and business objectives to achieve. It is hoped that it will be both an insight and an inspiration to the administration of MUC to consider having a modern information system.

1.1 Introduction

Generally, Information Technology (IT), is the term used to describe technologies that enable us to record, store, process, retrieve, transmit and receive information. It encompasses modern technologies such as computers, facsimile transmission, micrograghics, telecommunications and microelectronics. Although the "Information Technology"is a recent addition to the language, the concept is as old as people's desire to communicate. And as we can remember, previous methods have had their own limitations and that has always called for improvement. It will not be a wonder then that the technologies we adore today will be outdated in the next one decade in some parts of the world.

Information Technology enables us to build effective information systems. It is common knowledge that without the sensible application of IT, we run the risk of being inefficient and unproductive. We can end up drowning in paperwork if we do not sensibly apply IT. Inevitably,as the volume of transactions increases and more people become involved, our systems must become more sophisticated to cope. Therefore, the primary purpose of IT is to acquire knowledge, process it into useful information and make it available for use in carrying out the functions of an organisation.

A large amount of data is generated during a normal working day in any organisation. For business organisations such data would include: receiving customer order; processing payments; issuing stock; analyzing previous sales; projecting

future sales; paying employees; ordering goods from suppliers; answering stock queries. For an academic institution such as a University,such data would include: student records; examination records; accommodation records; financial records;library records; staff records; courses' records; university plans; etc

Traditionally, filing cabinets have been used for data management purposes. Most staff in such situations become preoccupied with managing the pieces of paper stored in the cabinets rather than the data stored on them. In a manual system, we are so busy managing these pieces of paper rather than the data recorded on them that we lose sight of the value of the data. It is necessary to organise data so that it is easy to process, easy to store, and easy to retrieve. The need for better data management is one reason for the widespread use of computers.

It is known that every organisation is involved in a number of activities which are carried out in separate functional areas. Each major area has activities to perform, but the activities cannot be performed in isolation. Each area must make information about its activities available to the other areas so that the whole business operates efficiently. For example, the areas of purchasing, production, marketing and personnel all feed data to the accounting system. From this the accounting section must produce reports required by people within the organisation and information required by outside bodies.

Such shared information could prove useful for administrators of academic programmes in a university such as Deans of faculties, Heads of Departments, Academic registrar and other senior managers. The purpose of an Information System(IS) is to produce quality, timely information. The raw material from which information is produced is data. Data must be processed in some way to get the required information. In a manual system, the processing is done by people who follow a set of instructions to convert the data into information as shown below:

Fig. 1-1

Similarly, we can use a machine such as a computer to convert data into information. All we need to do is to specify the set of instructions the computer must follow. Usually, computers are widely used in preparing heavy tasks such as payrolls, airline reservation, design of large aeroplanes, ships,etc. In an organisation, however, preparation of payroll is not the only one major thing that computers can do. There are other important applications when it comes to maximising the impact that good information systems can have in an organisation.

For example, preparation of examination transcripts, keeping student records, personnel records, transaction records, etc. We also need information to facilitate decision making. But we cannot make the best decisions unless we have adequate information upon which to base them. Therefore, the role of an IS is to ensure that we produce the information we need, when we need it.

The USA, UK and Japan were pioneers in introducing IT, and using it to achieve competitive advantage, followed by many other countries in the industrialised world. In Kenya, there has been little investment in IT, and whatever little has been done is mainly in the area of telecommunications. Government services are still largely manual where people are buried in paperwork. Maseno University College (MUC), being a government institution is caught in the same problem like many other government offices and parastatals. But what remains clear is that there is urgent need for the government and government institutions to start exploiting the information technology which has been made available to improve the services rendered. Kenyan universities handle records of so many students that they cannot be effective if they continue with manual systems. It is not unusual that examination records of one candidate can differ from one office to another thereby causing confusion and uncertainty.

Demand for services have changed dramatically over the years. Because of the increase in demand for services, there is an ever increasing need for organisations to install computers that can process the required information faster

and efficiently. Developments in technology have been a predominant force in changing the structure of information processes. Those organisations which can identify the emergence of technology as a major change agent in the future of their industry can gain significant advantages by leading in their respective industries.

MUC, which is a constituent college of Moi University, was abruptly started in 1990 through a presidential decree. It started with 1500 students in the Faculty of Education. In its second academic year, 1991/92, the College started a second Faculty of Science. The University College occupies two campuses, Siriba and Government Training Institute (GTI), which were formerly used for teachers' and civil servants' training respectively. The two campuses are about 1.5 km apart.

The only information systems inherited by the university college were two telephone switchboards consisting of 52 extensions. But the situation changed a little in early 1994 when the German government donated a Personal Automated Business Exchange (PABX) machine which has been installed and can carry 1000 extensions. It is important to note here that this machine can connect the University computer system to the rest of the world and expose MUC to a new range of Information through an internet. Since MUC has opened a new department of business and investment, this kind of network will give it competitive advantage.

Organisations as we know are not loose confederations of workers and workstations. Successes and problems in one

corner of the enterprise affect activities in other parts, even if they are geographically separated. Organisations are systems-individual components interconnected and pursuing goals and objectives. Executives use information to communicate with one another and with other staff members. Therefore, information is the adhesive that holds the components of the organisation system together. With a computer, the user can manipulate accounting and management information to test the effect of alternate strategies and evaluate the reason for current business results; compress large volumes of data into a single graphic display that shows trends in vivid colours; transmit and receive files of information from one end of the country to the other in seconds; prepare reports, proposals, and correspondences, making rapid revisions as needed,and automatically print the result much faster than a human typist.

Information has value because it influences the way an organisation operates. Not having vital information can cause managers to make mistakes, miss opportunities, and encounter serious performance problems. Information systems are also a resource. They increase the capability of managers and workers, and they make it possible to achieve new levels of effectiveness and efficiency. Research shows that as much as 80% of the typical executive's day is dedicated to information receiving, communicating, and using it in a wide variety of tasks. And because information is the basis for virtually all activities performed in an organisation, systems must be developed to produce and manage it.

The main objective of such systems is to ensure that reliable and accurate information is available when it is needed and that it is presented in a useable form. It is important to note that an Information System is a set of people, data, and procedures that work together to provide useful information.

The emphasis on systems means that the various components seek a common objective of supporting organisation activities. These include day-to-day business operations, communication of information, management of activities, and decision making. For example, banking institutions could not cope now without information systems relating deposits, withdrawals, loans, etc.

Meanwhile, Information Systems need not be computer-based, but often they are. The determining factor is whether a system can be improved by including computer processing capability. If a manual system of people and procedures can perform a task efficiently and without error, there may be little reason to use computers. But often, as the volume of work grows, procedures increase in complexity, or activities become more interrelated, and improvements can be gained by introducing computer assistance. The computer complements, rather than replaces individuals. Similarly, computers can become valuable assistants in decision making. They can augment the capabilities of individual users by making them more productive and more effective. In this dissertation we will use the term IS in referring to both computer based and non-computer based systems.

1.2 Objectives and Rationale

The objectives of this dissertation are to:

* identify and analyze the effects of introducing IT in MUC.
*provide an insight and inspiration to the University administration to consider having a modern information system.
*recommend potential solutions to the IT problems currently faced at MUC.

The rationale for choosing this topic for study is to:

1. Introduce IS which can support manual services provided by MUC to create efficiency and effectiveness
2. Explore ways of capturing data, storing data, retrieving data, and maintaining data integrity and consistency.
3. Make necessary information available to management and employees at their working stations promptly
4. Save MUC staff and students walking between offices looking for information.
5. Enable the investment division of the University College to compete effectively with rivals.

1.3 Methodology

To discuss the issues relating to IT and its uses for effectiveness and efficiency, it is necessary to utilize and review existing literature; use my experience as an employee of MUC who has been handling examinations and student records; hold interviews with some staff at the University of Salford, who work in areas that relate to MUC functions and then draw a parallel.

1.4 Outline of the dissertation

The dissertation is developed through a number of chapters. Chapter two provides a brief background of IT in Kenya, MUC and the environment within which it operates. This is followed by an introduction of the subject of competitive advantage and the role which IT plays in achieving this advantage. The impact of IT is also examined here.Chapter three introduces the future plans of MUC especially in the area of IT. The existing systems at MUC will be examined. Urgent services that require IT support are discussed here. Prioritization is considered important because MUC cannot afford even the vital IS at once.

Chapter four introduces IS at the University of Salford, UK, for comparative reasons. The chapter also examines how the University of Salford is using IS to support its vital services in student records, examinations, accommodation, library (Academic Information Services), and others.

From the Salford findings, it will be shown where exactly MUC should channel its IT resources for efficiency and

effectiveness. Chapter five examines possible approaches that MUC can adopt given its mission, requirements, resources, and practices as compared to similar organisations elsewhere.

The impact of IT is examined more and related to the value chain. The chapter finally examines how IT can be managed for continued advantage. In chapter six, the dissertation gives some recommendations that MUC could be follow for the realisation of IT/IS benefits by the turn-of-the 21st century.

Chapter 2

The Subject

2.1 Background

2.2 Trends in IT/IS

2.3 Impact of IT/IS

2.4 Competitive Advantage

2.1 Background

Kenya, which is a former British colony, became independent in 1963 after 70 years of British rule. The nation is situated in the Eastern part of Africa and borders Sudan and Ethiopia to the North, Somalia to the North East, Tanzania to the South East, and Indian Ocean on the South and South East. Kenya occupies an area of about 225000 square miles.

Agriculturally,Kenya is known for its cash crops like tea, coffee, and pyrethrum. Tourism is also a resource which generates a considerable amount of income. Currently, tourism earns the country foreign exchange in excess of Ksh. 9 billion annually. Tourism as a service industry has grown over the years and attracts tourists from all over the world, especially Europe.

The facilities available to the tourists include game parks,hotels and communication systems. The nation's free trade with the rest of the world, has led to the development of telecommunication systems that can keep it in touch with all the major trading partners. It is considerably developed in the area of telephony and telephone services. The country has witnessed consistent installations of PABX in its District Headquarters since the early 1980s and most people can automatically dial and talk to each other.

The communications industry was a monopoly of Kenya Posts and Telecommunications Corporation(KP&TC) until 1991 when they liberalised some of the business. Mercury Corporation, which is a UK company, is currently the only

competitor in the sales of telecommunication equipment. Otherwise,service lines are still being leased from the KP&TC, which is the sole provider. It is hoped that all its services will be liberalised in future to face competition.

Whereas KP&TC has improved a lot in the communication industry, very little development has taken place in the computer industry. Therefore, the existing data communication systems have mainly been installed by private business enterprises which conduct their businesses internationally. Such private bodies include IBM,Rank Xerox, General Motors, Uniliver Group of Companies and International hotels like Hilton among others.

Although the country has done a lot in installing the PABX machines which can be connected to computers, the technology has not been tapped to any significant level. It is my conviction and prediction that this area will have rapid development as the basic infrastructure is already in place. Once awareness is created and possible advantages realised, the growth will be massive and rapid. In the long-run, the low cost of computer systems will definitely lure many. And since telephone charges have always been high and subject to fraud, the computer industry will be more popular in Kenya, especially with the business and academic communities which exchange data often.

MUC as already noted was started in 1990 as a constituent college of Moi University which is about 140 kms away. MUC is situated in western Kenya, 22 kms from Kisumu, which is the third largest town in Kenya. Maseno Town Council

where the university is situated runs a full post office with an automatic exchange to which the university exchange is connected. Therefore, MUC community can automatically dial any number nationally and internationally without any hindrance. Due to this PABX machine's capability, MUC has now installed facsimile machines and increased telephone extension lines to more offices. What now remains for the university to exploit is the computer services associated with the system. It is worth noting here that one of the objectives of MUC is to set up a Computer Science and Technology department in the 1995/96 academic year. This would immensely benefit from the infrastructure already laid by the KP&TC.

MUC has already started businesses which are income generating to the university. Investment enterprises of the university currently include farming, hoteliery and a bookshop. The university farm has a wide range of products that are marketed to staff and the public. The hoteliery business is in its infant stage but is bound to grow and provide services and accommodation to many guests. The bookshop has been catering for students but is expected to grow and serve the public as well. Since the focus is on expansion of these businesses, efficiency and effectiveness are crucial. All these businesses need the support of efficient telecommunication facilities. Like any other businesses, they deal with suppliers, customers and others therefore requiring modern information systems.

They need data communication services offered by computers to be close to the suppliers, customers, and other stakeholders. Because they are bound to face competition in these types of businesses, connected computer systems will give them some edge over other competitors.

2.2 Trends in IT

A data processing system may be viewed as an integration of subsystems that aid in solving business or scientific problems. Common subsystems include the operating system, database management system, languages, applications, and data communications. Each of these subsystems is implemented as a combination of software, hardware, and/or firmware. James Martin(1972), defines telecommunications as any process that permits the passage from a sender to one or more receivers of information of any nature delivered in any useable form, (printed copy, fixed or moving pictures, visible or audible signals, etc) by means of any electromagnetic system (electrical transmission by wire, radio, optical transmission, guides waves, etc). It includes telephony, telegraphy, video telephony, data transmission, etc.

Data communications may be defined as that part of telecommunications that relates to computer systems, or the electronic transmission of computer data. This definition excludes the transmission of data to local peripherals such as disk, tape, and printers. And in many countries, because data communications is a joint venture between the communications industry and the computer industry,

development has been a combined effort.

By the dawn of the computers era in 1940, the communications industry was already well developed. Telephone and Telegraph companies had developed a network of communications facilities throughout the industrialized world. In the US and numerous other countries, telephone companies had been given exclusive rights to install lines and to provide services in specific geographical areas, with government agencies exercising control over tariffs and the services provided. Also the telephone companies in the US and many other countries had exclusive rights to attach any equipment to the telephone networks.

Partly because of this monopoly on equipment, as well as the special status given to providers of data transmission facilities, the growth of data communications was somehow slower than that of other computer-related technologies. Large scale expansion of data communications systems did not occur until the 1970s. Generally growth occurred because of: large-scale integration of circuits, with the attendant reduction in the cost and size of terminals and communications equipment; development of software systems that made the establishment of data communications networks relatively easy; and competition among providers of transmission facilities with an associated cost reduction for data circuits. Without these developments, data communications systems would have been financially unfeasible for many computer users.

For example, comparing transmission costs in 1968 and 1973, just before and after competition appeared. In 1968, American Telephone and Telegraph company (AT&T) charged an average of $315 for 100 miles of leased telephone line. In 1973, the average cost of the same line was as low as $85.In July 1971, an IBM model 3270 terminal cost $71000(with a lease price of $1900 per month). In early 1985, the equivalent terminal listed for $6035.

Data communications is perhaps the most dynamic area of data processing in the last decade. From 1970 on, the industry has seen significant changes in costs, competition, hardware, and software ; changes that have provided the impetus for more systems to be implemented. The second half of the 1980s showed continued expansion of certain technologies, while others began to disappear. As more communication satellites are placed in orbit, the availability and utilization of this medium will increase.

With its high speed transmission and attractive expansion capabilities, the satellite medium appears to be a natural for some of the expanding technologies, specifically, image processing, voice synthesis, and video, all candidates for digital storage and transmission. The use of fiber optics is expected to continue expanding, especially for relatively static local area networks.Development in the PABX field should continue to enhance office telephone systems by allowing voice, data, and video images to exist on the same network. Expansion in the use of Local Area Networks(LANs) and Wide Area Networks (WANs) should continue at a rapid

pace. And instead of developing new network systems, software vendors have turned to the development of bridges and gateway systems that allow the large number of existing systems to interface with each other.

Digital data transmission will continue to expand, providing users with higher data transmission rates and lower error rates. This will have a positive influence on all aspects of data communications, particularly distributed processing systems, where transactions must span multiple nodes and where bulk data transfer is sometimes necessary. This trend coupled with improvements in database management systems to provide recovery, contention resolution, deadlock resolution, and transaction management over networks should remove some of the current barriers to the technology.

Further, knowledge of distributed systems will expand as a result of current implementations. The low price of communications equipment such as modems and processors have made computers and data communications an integral part of both private and professional life. The PC (personal computer) as a home appliance has become a reality. In addition to its use for games, education, and budget and household tasks, the PC has begun to function as an integral part of individual finances. The other services available on PC include: on-line banking, bill paying, catalog purchasing, electronic mail delivery, security systems on-line to police or private agencies, investment in stocks, bonds and cultural programmes.

A great deal of effort has gone into the development of computer-based information systems since computers were put to work automating clerical functions in commercial organisations. The change in views and approaches and the shift in the focus of attention have been partly caused by the rapid advancement in the relevant technology. Within this framework, we might gain perspective into the future, perhaps having more reason to believe that the large investments of effort, time and money in IS will produce fruitful results and that the potential of information technology will be tapped even more effectively.

Early commercial computers were used mainly to automate the routine clerical work of large administrative departments. These first systems were batch systems using fairly limited input and output media, such as punch cards, papertape and printers. A parallel but separate development was the increasing use of operational research(OR) and management science(MS) techniques in industry and commerce. Although the theoretical work on techniques such as linear and non-linear programming, queuing theory, statistical inventory control, statistical decision theory, etc., were well established prior to 1960, surveys indicated a burgeoning of OR and MS activity in industry in the US and Europe during the 1960s. However, the main focus of interest lay in making those operations, which were closely associated with the computer, as efficient as possible. This resulted in a new generation of programming languages with outstanding examples as COBOL and FORTRAN.

Also as the jobs for the machine became plentiful, development of special operating software became necessary, which made it possible to utilize computing power better.

Many problems in computerising work result from failing to take into account the objectives, views, and interests of all those with a stake in the outcomes of "going hi-tech". The technical efficiency of a computer-based system does not guarantee its effective use as intended by the designer. Such use will depend heavily on system acceptability to a range of stakeholders. Therefore, computer-based systems must be designed and implemented in the light of the organisational, social and political context which pertains, and of which they will be part. However, the problems have been in establishing precisely which procedures the management wanted automated and overcoming the perennial problem of over-inflated expectations.

The need for accurate information also highlighted a new requirement. Accurate information needs to be precise, timely, and available. During the 1970s most companies changed to on-line processing, to provide better access to data. Many companies also distributed a large proportion of their central computer operations in order to collect,process and provide access to data at the most appropriate points and locations. According to Kent(1978), by the late 1970s, the relevance of data clearly emerged. It was viewed as the fundamental resource of information, deserving treatment that is similar to any other major resource of business.

It became clear that separate "systems" were needed for organizing and storing data. As a result, databases and database management systems(DBMS) started appearing. The intellectual drive was associated with the problem of how best to represent data structures in a practically useable way (Chen, 1976; Davenport, 1979). A hierarchical representation was the first practical solution. Suggestions for a network type representation of data structures, using the idea of entity-attribute relationships were also adopted, resulting in the CODASY standard(1974).

2.3 Impact of IT

Computers and data communications have already had an impact on the work environment. Inter-office correspondent, image, voice, and videotransfer, and portable devices all play a significant role in shaping how companies communicate. Faster processors, improved problem statement and problem solving languages, together with data communications, have the potential of altering the world's current business and education processes. Computers and data communications bring a potential for social change equivalent to that brought about by the telephone and the automobile.

It has been predicted that everyone in the industrialized world is likely to become an operator of computer equipment and a user of data communications equipment by the year 2000.Already there are many nations of bank tellers who use automated teller machines(ATM) for deposits, withdrawals, and inquiries.

Telecommuting is another benefit associated with new technology. This technology enables people to perform their jobs in the comfort of their own homes and transfer the information to the office using internet. It is a suitable method for single parents who prefer to stay and work from home as they look after their children.

However, one of the biggest social problems with this new technology is the unemployment. Unemployment was the fear in the industrialized world when computers emerged and the same fear is widespread in the developing world of which Kenya is a part. Indeed this unemployment problem is Kenya's dilemma in its attempt to adopt the new technology. But there is evidence that this fear can be allayed in the long-run since computers lead to increased productivity as they try to complement the human effort. Porter and Miller(1985) state:

"IT is changing the way firms operate. It is affecting the entire process by which firms create their products. Besides, it is reshaping the product itself; the entire package of physical goods, services, and information firms provide to create value for their buyers".

2.4 Competitive Advantage

From an organisational perspective, IT can successfully be used for competitive advantage at both the operational and strategic levels. IT can give more control over manpower and facilitate more economical allocation of this manpower based on operational needs. The introduction of computer aided processes, controls, and monitoring which, in most cases, can substitute for human intervention, can lead to improvements

in quality. These processes can complement human judgments and aid both control and decision making processes executed by human managers within the organisation. This can also release the pressure from line management allowing them more time to concentrate on strategic issues rather than day-to-day operational matters. At the strategic level, IT can contribute towards the execution of generic strategies which require the broad support of all functional areas with the organisation in order to become effective. It can also help in the strategy implementation process. Reporting systems can track progress towards targets and success factors.

IT/IS can facilitate integration within management by making information readily accessible to different personnel and departments through joint terminal access to centralised or common database files. LANs can link different computers and their peripherals within the same, or WANs, enabling multiple access and distributed processing. The introduction of IT can lead towards simpler and smaller management structures by virtue of the advantages for control and integration.

The wealth of data and information made available by IT, not only on customers, but also on suppliers, competitors, industry, markets, materials, and within the firm, assets, manpower, financial and fixed assets, etc. gives the organisation the means for achieving both efficiency and effectiveness.

IT enhances managerial control by: providing better operational data, faster feedback, and more comprehensive and accurate information about operations; reducing the scope for personal misinterpretation intuition and human error by reducing reliance on personal expert judgment; and permitting the unification of previously segmented control systems, thereby increasing the potential for comprehensive, balanced appraisal of performance.

Chapter 3

The Current State of IT/IS at MUC

3.1 MUC Future Plans

3.2 Existing IT/IS at MUC

3.3 Services that require IT/IS Support at MUC

3.4 Prioratization

3.1 MUC Future Plans

As already pointed out, MUC was established in late 1990 without prior planning. Subsequent to such hurried situation, MUC started off by teaching the bachelor of education students in early 1991 using the inherited facilities, which were mainly buildings. The initial number of students(1500) admitted was by far bigger than the existing facilities and therefore so much pressure for the administration, lecturers and even other overheads within and outside the University College. Because of this pressure, the first appointed principal hardly completed a year before he was replaced.

It would be apt to say that the current principal(who took over from july,1991) has been very imaginative,visionary and pragmatic. He quickly formed committees that had different responsibilities but comprehensively covered all the operations of the University College. Through the Academic Board all the functions of these committees were integrated and harmonised to form the University's official operational documentations along with those of Moi, the parent University. This was a starting point. However, because of his concern for a masterplan for the University in both the short-run and the long-run terms, he organised a workshop to deliberate on the future plans of MUC in the short and medium periods. The workshop participants, who constituted some of the best brains in the country, were drawn from all sectors of the economy. The administration largely relies on the recommendations of the workshop

committee and it is tentatively used as the University's future plan. The document is known as:MUC-DEVELOPMENT OPTIONS WORKSHOP. Following is an excerpt of the workshop resolutions being used as the college's development plan for the next ten years.

"We the participants at the **workshop on Maseno University College Development Options** held at Sunset Hotel Kisumu from 5th to 7th of December 1991, having deliberated on several issues pertaining to the future of the University College, in the light of:

1. The role of the University to the individual, developing nation and manpower requirements;
2. The regions unique resources;
3. Financial constraints

and **conscious** of the need to:

1. Design curriculum that incorporates courses which allow students to engage in income generating ventures to make the University self-sustaining, while at the same time equipping the students with the skills which help them to be self reliant;
2. Have a planned University growth which does not unnecessarily duplicate the already existing programmes in other public Universities;
3. Evolve a University with unique characteristics;

4. Restructure the existing courses to reduce compartmentalization

do hereby resolve that:

A THE OPERATIONAL PARADIGMS BE:

1. Maseno University College aim at being a medium sized institution comprising between 4500 and 7000 students growing at a manageable rate of 100 students per year to 1996 and thereafter 50 students upto the envisaged optimum for undergraduate students. The ratio of the postgraduate students to undergraduates should stabilise between 20% and 30% at any given time(as in appendix 1).
2. Maseno University College should aim at training practically-oriented graduates.The programmes will involve emphasis on field and industrial attachments.
3. Maseno University College should be research oriented.
4. A masterplan for the University College be prepared taking into account the physical facilities already existing.
5. The drafting of the University College statutes and regulations be speeded up so that a legal basis of operations is applied in all situations.

B THE SHORT TERM PROGRAMMES(Less than five years) BE:

6.(i) A projects committee be set up to identify, promote and coordinate projects that will generate income to the University College.

(ii) A policy paper be drawn giving guidelines of income generating ventures for departments, centres, institutes and other relevant units.

(iii) Curriculum should incorporate the income generating ventures so that graduates of Maseno are practically oriented, capable of engaging in self- employment.

7.(i) A committee be set up to review and restructure the centre for inter-disciplinary studies to cover areas such as personnel placings and strengthening academic programmes.

(ii) The creation and development of an environmental unit be undertaken as part of the centre.

8.a(i) The faculty of Arts give priority to postgraduate programmes.

(ii) A centre for Creative and Performing Arts to include Music, Dance, Theatre and Cinema be established.

(iii) The Languages department be re-organised into department of African Languages(concentrating on local languages) and a department of Foreign languages.

(iv) Department of Religion be renamed Department of Religion and Philosophy.

(v) A Department of Psychology be established with a view to incorporating the existing Educational Psychology as a unit.

(vi) The Department of History be renamed the Department of History and Government.

(vii) Department of Economics be renamed the Department of Economics and Business Studies.

b(i) The faculty of Education students who show special talent and interest in a particular teaching subject, be allowed to major in that subject to enable the students enrol for postgraduate studies so that they may be considered for staff development.

(ii) The faculty of Education should mount Masters programmes to include:

1. M.Phil in economics and planning of Education.
2. M.Phil in Education Administration.

(iii) The Department of Curriculum studies and Educational Communication and Technology be merged and restructured to become the Department of Curriculum and Instruction with Educational Technology as a unit.

c(i) A committee be set up with a view to establishing schools of Biological and Physical Sciences in the Faculty of Science.

(ii) A Programme of Computer Science and Technology be started in the Faculty of Science.

(iii) A programme of Aquatic Sciences be established within the existing relevant department.

(iv) New courses in the Department of Botany and Zoology b

introduced to include:

- Bio-Technology
- Bio-chemistry
- Hydro-Biology
- Bio-Diversity

(v) Other courses to be introduced in the Faculty of Science will include Energy Systems where aspects of Material Science, Thermodynamics and conversion principles will be taught.

(vi) Postgraduate programmes in the Faculty of Science be started immediately.

(vii) Department of Mathematics be located in the Faculty of Science.

d(i) The Institute of Research and Postgraduate Studies to mount a postgraduate Diploma in Education programme for B.A and B.Sc graduates provided they sponsor themselves.

(ii) A Centre for Advanced Management Studies be established to coordinate postgraduate Business studies, Institutional Management, Labour and Industrial Relations.

(iii) Communication and Media Sciences school be established.

(iv) Policy Research in several areas be undertaken.

(v) Sandwich courses for practising teachers, education administrators, Headteachers and Principals be mounted in the centre for continuing studies, provided the participants pay.

C THE MEDIUM TERM PROGRAMMES(Five to ten years) BE:

9.(i) A Faculty of Agriculture and Agrarian studies be established.

(ii) A school of Medicine be established concentrating in areas that are not covered by other public Universities(such as Medical Technology).

(iii) A Faculty of Engineering be established giving emphasis to chemical, sugar and maintenance engineering.It should also have a bias towards telematics.

10. The department of Philosophy be established as a full fledged department.

11. The Education Technology unit be expanded to a full fledged department.

12. A department of Space and Earth sciences be established.

13. A centre for Advanced Management Studies be set up in ~~h~~ medium term where Institutional Management and Masters in Business Administration will be offered.

D THE LONG TERM PROGRAMMES (Over ten years) BE:

14. A school of Space and Atmospheric Sciences be set up.

3.2 Existing IS/IT At MUC

Before I discuss the existing IS/IT at MUC, it is important to understand the structure of the Institution. The future plans outlined in the Workshop resolutions (3.1) must fit within a given structure or the one intended. When fully implemented, the University College will be a fairly large

Institution with a hybrid structure.An organisation with a hybrid structure is one that combines functional activities like finance,personnel,etc. with product based activities such as programmes mounted by various academic faculties, etc to realize the overall goals of the institution.

The goals of MUC as can be seen from the masterplan are far reaching. They call for initiative, diversification, communication, coordination and organisationwide connectivity and commitment. For them to be fully realized, utilized and sustained, a great deal of IT/IS network will be necessary to support them.The Institution is divided into three divisions performing various activities.The three divisions are:

Academic-which consists of academic departments, library, bookshop, games, and academic registrar's office.

Planning &Development-which consists of estates, transport, farm and central services(telephones,institutional cleanliness etc.), accommodation,catering,etc.

General Administration- which consists of personnel,health services and finance mainly.

A brief analysis of IS/IT in each division will enhance our understanding of the needs and logically think our way out. It is important to remind ourselves, however, that we do not need IT for departments/faculties/divisions per se, but rather the IT should support the services offered by those functional areas.

ACADEMIC DIVISION

MUC currently has three faculties namely, faculty of Education, Faculty of Science, Faculty of Arts and a Centre for Inter-disciplinary studies. Faculty of Education has the following departments: Psychology, Foundations, Curriculum studies, Management studies, Communication and Technology. Faculty of science has the following departments: Botany,Zoology, Chemistry, Physics, Mathematics and Homescience and Technology. Faculty of Arts has the following departments: History, Geography, Kiswahili, English, Literature, Music, Economics, French and Philosophy and Religious Studies. The centre for Inter-disciplinary studies has the following departments: Quantitative skills, Development studies and Communication skills.

Out of the 23 departments listed above, only Mathematics has four computers for running a Computer Science course for students offering Sciences.The learning is mostly theoretical with few practical sessions as the number of students requiring the use of the IS/IT far exceeds what is currently available.The common computer languages taught include FORTRAN and COBOL.Practice by students on the computers is extremely minimal and therefore the objectives aimed at are not easily achieved.The computers in the Mathematics department are only accessible to the staff and students offering the course.This is quite unfortunate as more and more sectors of the economy are getting computerised.This even disadvantages students who are not computer literate on job placements in the employment sector.

The four computers being used for teaching are stand-alone type that use hard disk for storing information. But as can be seen from the University's tentative masterplan, implementation of Computer programmes is emphasised in section B(the short term programmes) 8 (c) and 8 (d). It must be underscored that even the other academic departments stand to gain if they can get the IT/IS support. Computer service would help them in running their programmes and communicate easily. For example, each department could enter their examination marks into the computer and could be accessed by the Deans of Faculties to process results for their Boards of examiner's considerations and subsequent release to candidates.

(ii) Students' Records and Examinations in Registrar's Office

There is one stand-alone computer for the above purposes. The problem is that there is big demand for the computer services but only one is available and cannot cope at all.Consequently, even student records have not been computerised. The available computer is mostly used on an ad hoc basis as the requirements range from those of the academic departments to the academic registrar's.

(iii) Institute of Research and Postgraduate Studies(IRPS)

The Institute has one fax machine and has postgraduate students doing masters and doctorate degrees.There is real need for computer support for the services offered here.

The postgraduate students have to do their work manually and this results in delays and at times distortion by typists in the process of typing.

(iv) The Library

The University college has two libraries (one in each campus) catering for about 2600 students and a further 1000 staff members. The system is completely manual and could be more efficient if it were computerised. Book losses are rampant because of this manual system.If the library catalogue was computerised, it would be easy to determine which titles are missing from their shelves.With a manual system, if a book-card is stolen or destroyed by either library staff or library user, the book is lost and can never be traced.But with a computerised catalogue, such wilful damage or loss can be minimised.

GENERAL ADMINISTRATION

The general administrative wing of the University College consists of three main departments namely, finance, health and personnel. However, only finance department has one stand-alone computer.The other departments operate manually from top to bottom.And even the computer at the finance department does not cover most of the work there.It is mostly devoted to preparation of staff-payrolls.It is hardly used for the preparation of other accounting documents like bills, purchase orders, payments, etc. There is usually a large crowd of staff and students trying to sort out their

financial issues between the accounts offices.Such a trend could be reversed if more computers were installed at different sections of the accounts section to handle purchases, supplies, bills, claims, etc. so that the services could be rendered more effectively and efficiently.

It is a pity that the Principal, deputy Principals, Registrars and their deputies have to rely on typed and doctored information which is rarely accurate. Any given information passed to the top management usually varies according to the time and situation.There is no consistency and integrity of information.This makes it difficult for the top management to make any good decision in real time.But with computer support, information integrity and consistency will always exist, thereby leading to better and faster decisions.

PLANNING,DEVELOPMENT AND STUDENTS ADMINISTRATION (PDASA)

This is the largest division in the University college and undertakes a number of functions. It covers the general areas of estates, transport,students accommodation and catering, games, farm, central services like telephones, institutional cleanliness, etc. Though the division is fairly large and carries out a lot of functions, it is operating entirely manually. All the records of various sections/departments are manually kept and face similar problems of manual records like alterations, loss, slow process of performance, etc. which results in gross inefficiency.

The departments in this division like games, accommodation, students affairs, catering, etc. deal in critical information which requires consistency and integrity.Therefore, IS support would increase productivity.

3.3 Services that require IT/IS Support at MUC

MUC requires several of its services to be supported by IT. The services range from routine operations to executive decisions on one hand and support for the academic services on the other.For MUC to support these divergent IT/IS requirements it simply needs a campus network. Therefore, in order to talk about services that require IT support at MUC, it would be important to underline the importance of campus networking which should be aimed at in the long run. This has underlying goals for the campus and community in which it is practised. Though the pressure for networking is still low in developing countries like Kenya, its practice and use in the near future is inevitable. All the academic institutions of the world would want to share research findings quickly. Similarly, all countries of the world are increasingly getting engaged in global trade and this must be supported by networks. Therefore, Kenya and its institutions in various sectors will have little choice but to get connected to the rest of the world by the use of computers.According to research results by EDUCOM in U.S about Campus networking, the summary below illustrates the possible academic benefits:

"Although networking has assumed a central position in many institutional plans and programs, defining an institutional context for it is not easy.Universities are struggling under new pressures for relevance in a society increasingly dependent upon technology to meet its goals. Members of the academic community have found it especially troublesome to balance the values attached to the preservation and transmission of knowledge--the education mission--with those attendant on the discovery of new knowledge--the research mission. Although the networking of campus computers is rapidly becoming an indispensable adjunct to both research and instruction, its cost and effectiveness are continually in debate. In the midst of debate, there has emerged, nevertheless, a strong commitment to the sharing of information and computational resources through the use of electronic networks. Among the reasons for this more visible role is the potential for networking to:

* increase research productivity by improving access to information, to supercomputers and other specialized computational resources, and to experimental devices and databases;

* advance the quality of academic research and instruction by expanding opportunities for collaboration and sharing of scholarly work;

* shorten the time required to transmit basic research results from campuses to the private sector and thus enhance national research and product-development capability;and

* broaden the distribution of scholarly opportunity and

creativity by connecting faculty, students, and professional staff from diverse and geographically separated departments and organisations.

These goals are not limited to the campus academic environment but extend to other institutions and research organisations on a national and international basis. Campus and intercampus networks are intertwined and interdependent. Each requires the other for maximum benefit."

In addition to the academic benefits above, there are normally business and administrative benefits that accrue due to networking.

This is with full knowledge that MUC as any other public institution will continue to venture into business activities to generate its own income as the government's finances keep dwindling. Indeed the government has urged all public Universities to venture into income generating activities. Because MUC handles business, administrative and academic issues, the following types of systems would ultimately support its present and future services and businesses:

1. Executive Information Services/Systems (EIS)

These are systems normally required to help the executive of an organisation to take strategic decisions.They have the capability of dealing with unstructured queries and provide some answers.Such systems are usually very suitable for large organisations.

2. Decision Support Systems (DSS)

These are management control systems at various levels of the organisation.These systems deal with structured and semi-structured information.Some examples of DSS include: calculators, spreadsheets, simulation model, DBMS, hypertext, Break-Even analysis, cashflow analysis, pay analysis, etc.

3. Management Information Services/Systems (MIS)

These are like DSS but deal only with highly structured decisions.They are commonly used by staff in lower operational positions.They include Data Processing (DP) systems, regular report generation(summaries of the past) etc. They normally form the basis for planning, and decision making -for example accounts payable.

4. Knowledge Work Systems/Knowledge Based Systems(KBS)

These are systems which support knowledge based activities. They assist people with little knowledge in a particular area.Such systems are important for search of more information.They can answer "what if" questions. They also offer explanations to questions.

5. Office Automation Systems(OAS)

These are systems which give support for office functions like word processors, faxes, E-mail, telephones.Such systems are common in every organisation.

6. Transaction Processing Systems(TPS)

These are systems which support basic routine activities like in retailing and banking.In retailing, such systems as Electronic Point Of Sale (EPOS) in supermarkets offer valuable services.They can be used to prepare bills, purchase orders, payments using EDI etc. In banking, we have the Electronic Funds Transfer Point of Sale (EFTPOS), Automated Teller Machines (ATMs), and EDI.Such systems would support the business unit of the University College.

3.4 Prioritization

From part 3.3, we realize that MUC requires IT support in its academic, business and administrative functions.The IT support requirements are immense but the resources to satisfy them are extremely limited. This calls for prioritization of the IT requirements.At any one moment, the top management will decide which area of the University needs IT support urgently.For example, the University College really strained to get computers for teaching purposes in the mathematics department.Similarly, it strained to get a computer each to the examinations section and finance department. These areas were in critical need from start and therefore had to be considered first although they still need many more to be more efficient.Therefore, prioritization involves critical analysis of an organization's requirements and the available resources that can be used to satisfy them.

What the management ought to consider in the IT/IS situation is whether it is worthwhile employing.

As noted earlier, if the activities can be done manually and efficiently then there is no urgency in getting the IT support.But if management realizes that IT support is crucial for a given area, then all effort should be made to employ their services.It would be unproductive and uneconomical to buy the systems for areas of the organisation that do not urgently need them.This would be treating IT as an ornament in an organisation.If IT can benefit the organisation more in a junior office, then let it be employed there without considering who will use it. Studies and experience have shown that some organisations buy IS on the basis of loyalty to some powers.This is counter productive and unnecessary for any right thinking management. Such cheap considerations should be shunned for the sake of the organisation's success and effectiveness in attaining its objectives.For example, a particular faculty/department that deserves a computer may be denied by the authority because the professor who heads it is in bad terms with the top management.Such trivial considerations may deny an organisation a chance to prosper using IT support. And when such considerations are rampant, the IT value cannot be felt.The organisation will always regret the purchase of such systems in the first place.

Gone are the days when IT used to be considered as an overhead cost. Budgets for telephone services in government offices have kept dwindling because they are not used to support the office work.Instead the systems are more used for personal gains like booking "nyama choma" dates, social gatherings, after work,etc.

It has resulted in massive cuts of telephone services in the government offices.IT should pay for any investment in it. It should help in the accomplishments of the tasks of the organisation and add value to the services.For example, if computers are employed in accounts section to support their services like payments, sales, bills, purchase orders, bank reconciliation, etc. the quality of service would improve and many people will not take a whole day following some payments in that section. Similarly, if computers are employed in examination section, students will get faster, better quality service than offered by the manual system. Instead of working out their results manually for many weeks, it can be done in a much shorter time using a computer.This brings about consistency, integrity and efficiency.However, any time the University wants to buy a computer it must ask whether the computer will really support the functions envisaged.If the answer is "no" or "unclear", then such a purchase should not be effected.

Meanwhile, it is inept to write a prescription on how managers of organisations should prioritize their IT requirements and purchases. This is a highly subjective issue and varies from manager to manager. The different perspectives of managers bring different IT/IS support services to the organisation. Some managers are driven by favouritism,nepotism,power politics in the organisation, etc. while others are driven by professionalism, realism, and commitment to the organisational goals.Ultimately, the quantity and quality of services provided by the IS would

justify their purchase by the organisation.A manager who goes for executive systems which do not support much of the organisation's services is bound to regret sooner than later than one who goes for the systems really needed to support the vital functions.

However, the guiding factors should be the quantity and quality of work desired. IT support is usually desired in areas with heavy routine functions. Such areas involve a lot of data. For example, accounts section, personnel section, student records, examinations, medical records, etc. An organisation should look at such areas as first candidates of IT support. Once such areas are supported, then networking them would be the next stage so that data communication in the entire organisation is enabled. Then other systems for monitoring can be installed to keep track of performance of sections and personnel. But as already pointed out, the sequence of events would be highly contingent on the manager/executive of the organisation. All managers are advised to put the interests of the organisation first as opposed to theirs. And in case of uncertainty, a manager is advised to involve the services of an expert in the organisation or from outside before commiting the organisation in wrong regrettable decisions.For MUC, it is a difficult situation and calls for management's serious consideration. The young institution requires balance and/or bias in its attempts to achieve the academic,business and administrative goals of the institution. Producing the right mix is very important.

Chapter 4

Current state of IT/IS at the University of Salford

4.1 Current state of IT/IS at the University of Salford

4.2 How IT/IS Support Services of Student Records

4.3 How IT/IS Support Services at A.I.S

4.4 How IT/IS Support Services in other Departments

4.1 The Current State of IT/IS at the University of Salford

The University of Salford, which is situated in the North West of England, started as a royal technical college in 1896. It became a University in 1966. The institution has had a steady growth of enrolment and now has about 7000 students in various courses.Though not a large institution by U.K standards, it is a suitable comparison with the Kenyan Universities.It shares the usual University goals and at the same time striving to survive in a competitive, difficult economic situation. For Maseno, it is an ideal comparison as it plans to have about 7,000 students upon its maturity. Similarly, Maseno hopes to have a number of courses ranging from practically based sciences to liberal arts just like Salford.

Technologically, the University of Salford is by far ahead of Maseno. Most of their services are supported by computers as they also continue to improve on them. As will be seen in the parts to follow below, they also feel very inadequate in some areas and keep on making more efforts. Their big blessing however, is the general level of technological development in the U.K and Information Technology in particular. The infrastructure for IT has been in existence since 1940s and has been improved on every year. For example, the invention and use of Computers started in Europe and the U.S. The invention of PABX machine was a landmark in the development of Information Technology for the West and the U.S.

For telecommunication purposes, it resulted in automatic switching where individuals are automatically connected to the required numbers. And by the use of communication protocols like modems and gateways, the machines can enable communication of data between computers.This has benefited the institutions situated in such areas. In any case, most of the Universities in the U.S and Europe have always been involved in research which has resulted in innovations and improvements. The governments in these areas together with the Universities and industry have worked together towards innovation in technology. This is behind the various technological revolutions that have so far taken place in the developed world.

Because of their relentless efforts, the bodies continued to innovate more and more until they came up with the current generation of computers that can remotely communicate data, image, etc. in real time. The developed countries are indeed using this Computer technology to support many of their functions in the industry, education, commerce and trade. Their continued efforts have given them more gains with failures acting as their strong learning points. Through repeated attempts they are quite far in technology compared to Less Developed Countries (LDCs). The biggest advantage for LDCs is that they can borrow the technologies cheaply to support their young industry, education, commerce and trade, etc.

Universities in the U.K have been able to team up in groups to enjoy some of the IT products where they cannot

make it individually. For example, Universities in the U.K have had an Universities Central Council on Admissions (UCCA) since 1965 to handle all the Universities admissions cases through a central database. However, when the Polytechnics were upgraded to offer degree courses three years ago, UCCA changed its name to Universities and Colleges Admissions System (UCAS) using the same central database that UCCA had used hitherto.Similarly, Academic Services (libraries) in the U.K have organised themselves in groups to purchase some databases which are otherwise very expensive for one University to buy and run effectively. Manchester University and the University of Salford have such joint venture where they have purchased OCLC First Search database which is accessed by users of the two Universities via the network. UCAS is comparable to the Joint Admissions Board (JAB) of Kenya. Though the two run on the same principles, the U.K one is computerised while the Kenyan one is manually operated. The U.K one assumes that each University has already created a Local Area Network (LAN).

By the use of networks already established by the Universities, each gets the lists of admitted students through the computers. These lists contain all the personal details of each student. Individual Universities get their lists via the Computer. There is no travelling involved as the computers are used for all the required information. And based on the requirements of each University faculty, the computer does the selection upto the number required. There is a clearing scheme whereby candidates who miss their

choices but qualify for other Universities are considered. The method ensures that there is no compromise in admissions as the computer does not know the son or daughter of a powerful politician, etc. But this is easier said than done. If JAB duties could be computerised, then Kenyans would start enjoying fairness, where those who do better would get their University and faculty choices irrespective of tribe, colour or political inclinations of their regions.

This chapter examines how the University of Salford uses Information Technology to support its services. Salford like Maseno has academic, business and administrative goals to achieve. Some of the areas to be studied for comparison purposes include: Academic Information Services, Student Records, Finance, Accommodation, Personnel Records, and others. From the information gathered in this chapter, we can look for possibilities for MUC by the year 2000.

4.2 How IT/IS Support Services of Student Records at Salford

The University of Salford gets its students records from the Universities and Colleges Admissions System (UCAS). The central database for all the Universities in U.K was inaugurated in the 1960s to handle all the cases of students admissions into various Universities. UCAS gets information from the forms filled in by students who seek University admission in U.K. The forms contain all the personal details of each student. All the personal details are keyed into a computer and stored in the database.

After the selection exercise conducted by the UCAS from the database, all lists are sent on-line to the respective Universities.The computerised lists are sent out with all the personal details of each admitted student. This process is followed for any student who applies to more than one University in U.K and it is for undergraduates only. Therefore, individual Universities do not look for personal details from students on arrival. However, there are other records that students provide on arrival at each University. Such records provided on arrival include: term-time address; courses(modules) offered each term; sponsor's address; accommodation address; etc. Such additional information is never contained in the initial forms that UCAS has.

UCAS was born from the Universities Central Council on Admissions (UCCA) three years ago. But the system has been in operation since 1965. Initially UCCA was only for Universities in U.K but this had to change three years ago when Polytechnics were upgraded to offer degree courses. It is important to note that the extra information provided by students on arrival is never sent to the UCAS database as it is only used by the respective Universities where students get admitted.

The records section keeps records on examination results of each candidate. The section uses such records to prepare transcripts and certificates.This does not mean however, that other records are not kept by the section. On the contrary, all the records forwarded by UCAS and the ones locally captured are stored for use by the section.

Salford, therefore, has created a database for its own use. And like any other University in U.K, it sends statistical returns to the Higher Education Statistics Agency (HESA). The body is furnished with all the details of each student including academic progress. The reports which are electronically transferred by the use of computers are given annually.

The records for postgraduate students are captured and stored by individual Universities. The forms filled by students form the primary source of information. The information is transferred from the forms to the computer and stored in the database. However, at the end of each academic year returns are sent to HESA as in the case of the undergraduates. Although the examination results have been stored in disks, this is bound to change in 1996 when a central database will be in place for use.

4.3 How IT/IS Support Services at Academic Information Services (A.I.S)

The University of Salford has an Academic Information Services (A.I.S) centre which combines the library services with the computing services. This enables the centre to provide services in printed information (mainly through books and journals) and non-printed information through the computers. A.I.S facilities are mainly provided for the support of teaching, learning and research. The users of the centre, who are mainly students of the University, fill in forms which contain personal details before they are given

user numbers and passwords which can allow them to access the computer services provided by the centre. Users also register with the library section of the A.I.S. The personal details provided here are not a lot as they merely supplement what is already held at the registration point of the University. They stick the A.I.S's library number at the back of a student's University identification card which can easily be scanned by the computers when one borrows any material from the centre.

It is noted that A.I.S provides library and computing services. Some of the services supported by Information Technology at the centre Include:

(i) Circulation--which involves loans, recalls, reservations, interlibrary borrowing, management information, etc.

(ii) On-line catalogue--which enables users to get information from the computers about the titles at the centre. Users do not have to go through the shelves before confirming that the books looked for are available. In any case, through the computer search, a user is guided to the location of the title.

(iii) Placement of orders--A.I.S centre is connected to its suppliers and this makes it possible to place requests for more materials through the computers using Electronic Data Interchange (EDI). This saves the centre and the entire University money and time.

In any case, Blackwells, which is the main supplier encourages customers to get EDI service for ease of business transactions.

(iv) Compact Disk-Read Only Memory (CD-ROM)--this service is enabled by the IS available at the centre.It enables users to access different types of information stored in such disks. The centre has local and networked CD-ROMs. Most of the networked CD_ROMs provide information in areas of applied sciences while the local ones have a mixture.

(V) OCLC First Search--this is a collection of databases containing references to books or articles from periodicals, reports and other publications. Currently, OCLC first search is a gateway to about 30 million records containing book titles and other specialised articles. This service, which is provided through the network, has its headquarters in the U.S.

(vi) BIDS--is a service which provides access to several databases and is particularly good for sciences and engineering information. It is accessed through the network though the service is provided externally.

(vii) Photocopying--the centre provides self service photocopying by the use of electronic strips on flexicards.

(viii) Data Processing and Printing--The A.I.S has about 370 PCs accessed from about ten different points. Through the PCs one can process data and print it on laser or local printer. The two types of printers are also located at different points of the University to be accessed by users easily. Most of the big buildings housing different types of courses have their PCs and printers. Even the photocopying services are equally distributed at various points in the University.

Generally, IT/IS enables A.I.S centre to:

* acquire or order books and other materials
* make a catalogue for the books and materials available at the centre
* make on-line catalogue possible for users
* support the circulation process which involves loans, recalls, reservations, interlibrary borrowing and management.
* access, retrieve, manipulate and maintain users records
* provide security to the print and non-print materials at the centre against theft, damage, etc
* provide better and faster quality services to users
* minimise replacement costs as petty thefts are rare
* distribute the computational services throughout the University.

Additionally, the centre has a BITS & BYTES shop which offers a wide range of computer consumables at low prices. For example, floppy discs, ribbons and cartridges for a range of popular printers. One can purchase PCs and other hardware from the shop, and obtain advice in making a choice.

4.4 How IT/IS Support Services in Other Departments

(i) Finance

The University of Salford uses computers to support its services in Finance department. The computers are mainly used in the finance department as Decision Support Systems as well as Management Information Systems. This has been made possible because the procedures are very clear. Each department/faculty knows how much money to spend in any given financial year. Similarly, these departments/faculties know the procedures to follow in case they want to use their voted allocations. Usually, there are meetings that discuss budgets for various sections of the University and agree on particular amounts for disbursement during a given period. There are ceilings that each departmental head must observe when purchasing items for their departments. Procurement procedures are also very clear as laid down by the central purchasing.

The Director of Finance usually makes information available to departmental heads through the computers. Through a method known as Profile, each head of department can have access to the finance database and retrieve information that he/she requires. There are security features such that it is not possible for one to access data which is not his/hers. This is to ensure that only legitimate users of the information access it. It also enables departmental heads to know how much of their allocations still remain so that they do not overcommit.

The Finance Director prints out statements for each department each month so that they can cross-check for any mistakes that may have occurred. The Director,however reckons that the statements are not necessary since the departmental heads can always access information on-line using their computers. The printing of monthly statements is therefore bound to stop soon.

The database operates in a hierarchical way. Users can only access designated information. For example, in finance department, the clerical and accounting staff can only access information relevant to their duties. But as you move to senior positions, more and more information is accessed. The Director and his senior staff do access all the information to do with finance in the University. They can access all the information about accounts receivable and accounts payable at any time. Computers also help them to monitor various financial activities going on in the organisation. The finance department uses computers as Office Automated Systems, Decision Support Systems and Management Information Systems. And because of the computers support, the Director agrees that there is high level of efficiency. Handling of invoices is quite fast. The department handles about 1000 invoices in one week. Similarly, because of computers, the purchasing unit which is part of finance but located 3/4 km. away appears as if it is in same block. The distance is hardly felt as the two are connected by network and most of the data communication is enabled. Finance Department uses about 25 computers to support its services.

(ii) Accommodation

The accommodation department of the University uses computers to support its services. The department has seven computers to support its functions. The department captures data from the forms filled in by students when they apply for accommodation before the reporting date. And on reporting, the information contained about each student can be retrieved and used quickly to serve the students. On retrieval, it will show the personal details of each student, accommodation already offered, payment state, etc. As back-up information, the department also keeps the forms in files just in case something goes wrong with the computers.

The support of IT/IS has made it easier for the department to deal with a large number of resident students numbering about 4000. There are hardly any queues outside the office. The payments for accommodation are made directly to the accommodation office by either cash, cheque or bank order. However, the department encourages students to use bank orders. Through the use of computers, information integrity and consistency is achieved. Record updates are instantly made if necessary and this culminates in efficiency.

(iii) Estates and Building

The department has a TIMS database which supports the services in the department. The Estates and Buildings department of the University do repair or planned preventive maintenance. They do these functions by use of a job instruction docket.

Each docket has a unique number depending on the University department that has used it. Each docket has enough details filled to help the Estates and Buildings department to identify the location of the fault, the nature of the fault and the department to which the associated costs can be attributed.

TIMS database is used in the department to record manhours and materials used. The record also produces a code for the individual fitting/piece of equipment being repaired. The system records the date job is completed and number of hours taken. Generally, TIMS is a database used to store a history of jobs performed with a minimal amount of associated data. The University is exploring possibilities of using more of its capabilities since it has more features. The systems in the department have not been integrated into the University's central database.

(iv) Personnel and Payroll

The personnel section of the University still operates manually except the payroll. However, the personnel information is to be computerised soon and the process is already underway.

(v) Others

There are many other departments/units of the University that get the IT/IS support. Such other departments include: stores and inventory; health unit; University businesses among others.

The University of Salford has been able to develop its Information Systems because of the cooperation and support of

the top management. Similarly important is the cooperation of users who are mainly staff and students. The administration admits that the quality and quantity of services provided have increased by many fold. And according to the Registrar's department, though the initial cost of installing Information Systems may be high, the gains are immense and diverse. All it needs is careful planning, implementation, support from top to bottom, evaluation and utilization.

However, it is true that introduction of IS/IT result in a shift of power either at the individual level within the organisation or at group level. It is therefore important for management to identify where the balance of power lies and where and how it is likely to shift. This will allow policies to be developed to comply with conflicting interests.

Chapter 5

Possible Success Factors

5.1 Effectiveness and Efficiency

5.2 How MUC can Install Effective IT/IS

5.3 The Value Chain

5.4 Management of IT/IS

5.1 Effectiveness and Efficiency

Every organisation has some function to perform and some incentive or justification for their existence and for their operations. The activities of the organisation are directed to the accomplishment of its goals. The goals of an organisation will determine the nature of its outputs and the series of activities through which the outputs are achieved.

C.Perrow(1961), divided organisational goals into two namely, official and operative. According to him, "official goals" are the general purposes of the organisation as put forth in the charter, annual reports, public statements by key executives, and other authoritative pronouncements. "Operative goals", on the other hand, are the ends sought through the actual operating policies of the organisation; they tell us what the organisation is trying to do, regardless of what the official goals which are basically the aims. Operative goals are sub-goals which can also be referred to as objectives. Many organisations will have wide ranging goals and even in stable circumstances, it would be unlikely if all of these were achieved equally. Differences from different goals will, of course, be valued differently by groups or individuals within the organisation so that in this case, there would actually be different views on the effectiveness of the strategic decision making.

Organisational effectiveness from a systems point of view is defined as, "the ability of the organisation, in either absolute or relative terms, to exploit its environment in the acquisition of scarce and valued resources."

According to internal process approach, the effective organisation has a smooth, well-oiled internal process. Employees are happy and satisfied. Departmental activities mesh with one another to ensure high productivity.

Early management theorists defined effectiveness as the meeting or surpassing of organisational goals. The system resource model approach defines effectiveness as the degree to which an organisation is successful in acquiring and utilizing scarce and valuable resources. And according to this approach, an organisation is judged efficient if, when compared to similar organisations, its outputs (or benefits received) are relatively high in comparison to its inputs(or costs). For example, if two companies making the same product finish the fiscal year with equal production levels but one attained the level with fewer invested resources than the other, that company (other things being equal) would be described as being more efficient.

It is important to note that an organisation could easily be judged effective without being efficient and vice versa. Neither condition is a necessary prerequisite for the other. However, organisational effectiveness is defined in terms of goal attainment. The greater the extent to which an organisation's goals are met or surpassed, the greater its effectiveness.

5.2 How MUC Can Install Effective IT/IS

Nearly all organisations now undergo transformation to meet the needs of the customer. Business organisations are changing from the former large entrenched bureaucracies to thin flattened and responsive ones. Boards of companies are now expected to "add value" to the goods and services they provide and bring about significant change. Corporate organisations are changing to more flexible and responsive forms. Networks are being established which embrace customers, suppliers and business partners. Unfortunately, in many organisations, a wide gulf has emerged between expectation and achievement. IT is often part of the problem of bringing about change. IT is the major barrier to the effective operation of those cross-functional processes that really add value for customers.

Through surveys, it has been established that corporations desire changes but bringing about the change is the problem. However, the British Institute of Management (BIM), through its surveys have established some trends. Externally, priority is being given to building closer relationships with customers, while internally the focus is upon harnessing human talent. These trends call for the use of IT in the achievement of corporate goals. This is true with IT because it can facilitate group working, learning and new "network" relationships with customers, suppliers and business partners. Chief Executive Officers (CEOs) are beginning to define their organisations in network terms.

As fewer companies are able by themselves to deliver "total value" to customers, they are creating networks of relationships with electronic links forward into customers, backwards to suppliers and sideways to business partners. Networks and supply chains are becoming global, bringing together all those who share a common vision or a particular mission. As a consequence, the formulation and implementation of IT strategy increasingly involves cooperation and collaboration across organisational and national boundaries.

At MUC, achievement of Academic, Administrative and Business goals is primary. Other goals like individual preferences are subordinate. The need for IT/IS support is to attain the organisation's goals. If IT/IS is poorly planned then disaster occurs. Therefore, proper analysis and strategy is necessary for an organisation to benefit from IT/IS acquisition and implementation. There are various methodologies open to organisations for IT/IS implementation. Some of the methodologies are Information Engineering, YOURDON, "Soft Systems approach" and others. The soft systems approach is commonly referred to as the Chechland approach. This section will examine the Checkland approach as one that MUC could use to analyze its problems.

In its attempt to have a computer based Information System, MUC, has to develop an information model. The question faced in developing an information model is "How do we decide which database(s) to design?". The problems of which databases an organisation should have represent the problems of the future.

Strategic planning is an area of vital importance to the successful introduction of Information Systems. The Checkland methodology looks at how this strategic planning can be undertaken and also how the organisation can be divided up so that databases are developed systematically and coherently.

One of the roles of the data administrator is to liaise with senior management and establish strategies and priorities for an ordered approach to the development of databases. In larger enterprises, the problem is magnified and attempting to create a single data model for the whole enterprise, or designing a single database, will prove impossible. In such a situation, the Entity-Relationship (E-R) model is too detailed to capture all of the data of interest to the enterprise. There is, thus, a need for a higher level model of the enterprise which divides the organisation into "Information Areas" (IAs), which form logical collections of data and processes which are relatively self-contained and well-bounded. An information area could be a business area such as personnel, payroll, production or accounts, or it could correspond to the major "subject" which a business is concerned with such as customers, products or employees. In an academic institution like MUC, it would also cover academic departments, student records, library and computing services among others.

A number of systems development methodologies like BSP(IBM) and Information Engineering (James Martin) recommend several steps before information areas can be defined. The stages of Information Engineering will be discussed in the

recommendations section of chapter six.

Peter Checkland, with his colleagues at Lancaster University, developed an approach to solving business problems known as the "Soft Systems Methodology". The Systems theory is concerned with viewing the world as a collection of systems. He worked a general model of a human activity system which he referred to as a formal system. This is a practical model, based on experience, and concentrating on the components which need to exist if the system is to be capable of purposeful activity. He believes that System, S, is a system if:

(i) S has an on-going purpose. For example, a goal which can be perceived differently by different actors--the purpose of hospital could be perceived as "providing me with a job" (the doctors,nurses,cleaners, etc.), "making me better" (the patient), "operating efficiently within my budget" (the administrator).

(ii) S has a measure of performance. Not always possible to quantify, like knowledge acquired in an academic institution.

(iii) S contains a decision-taking process

(iv) S has components which are themselves (formal) systems.

(v) S exists in wider systems.

(vi) The components of S interact so that effects and actions can be transmitted through the system.

(vii) S has a boundary which separates it from its environment and other systems.

(viii) S has resources which can be used, including any subsystems of S.

(ix) S has some guarantee of continuity and will recover stability after a disturbance.

The Soft Systems Methodology

This methodology does not offer guidance on how big a system should be but implies that the methodology is suitable for systems, subsystems and wider systems. One of the great assets of systems thinking is that if a system becomes too complex to be thought of in a "mind-size bite", it can be split into sub-systems which can then be considered (relatively) independently. The basic philosophy is that the observer (user):

(i) identifies or defines some systems

(ii) perceives or invents some principles of coherence

(iii) identifies or envisages some mechanisms of control

and as a result of this the observer(user) can:

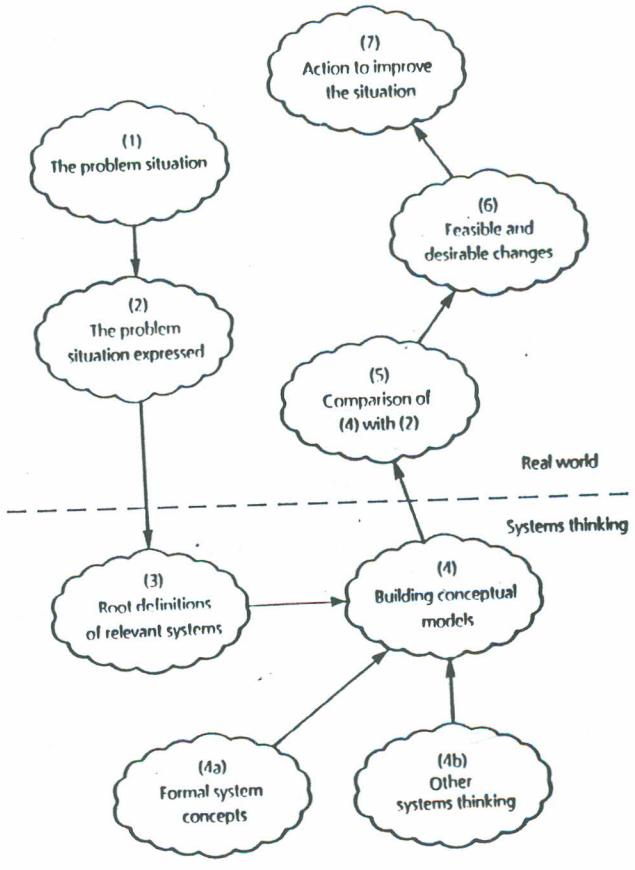
(i) define the boundary of each system

(ii) hence define the inputs and outputs of the system

(i.e anything which crosses the boundary)

(iii) examine the structure(s) of the system.

Checkland's methodology as in the diagram below has seven stages which can be undertaken in any sequence and starting at any point.



Eig. 5-1 Soft Systems Methodology (from Checkland)

The methodology is divided in the real world activities (1, 2, 5, 6, 7) and the systems thinking activities (3 and 4). The significance of this distinction is that the creative activities(3 and 4) should be accomplished away from the influence of existing processes and structures. The methodology is powerful because the systems thinking

activities are radical and relate only to the system as conceived and not the current system. The stages of the system can be briefly explained as:

(i) 1 and 2-The problem situation under investigation should be examined in terms of its structures, processes and the people and points of view involved. This is the analysis of requirements, goals, objectives, etc.

(ii) 3-Name the relevant system(s). This process involves the construction of useful root definitions(RD) of the system(s) which describe, "carefully and explicitly" what the system is. The RDs refer to the Clients, Actors, Transformation, Weltanschauung(German word meaning "world view"), Owners and Environment (CATWOE).

(iii) 4- Construct conceptual models. These are the design of the "ideal" system to achieve the RDs.

(iv) 5- The ideal system (i.e the conceptual model of the RD) is compared with the expression of the current situation. Problems are thus exposed.

(v) 6 and 7 -Deciding which changes are feasible and desirable and what action is necessary is another system ("the implementation of changes system") and so the methodology can be applied to these activities.

The soft systems methodology, and systems thinking in general, has won a lot of converts over the last few years. Its main failing however, is in the range of conceptual models-i.e in its techniques which it offers to accompany the approach. But the author argues that this allows more flexibility and radicalism in the design. However, without well-defined techniques, the methodology cannot be automated and so it remains heavily reliant on the skills of the analyst. These skills can be made more effective if the analyst develops the habit of systems thinking.

The discussion of systems has highlighted that there will be a variety of perspectives on problems, situations, goals and objectives which must be reconciled. It is also true that middle management can rarely see their role in relation to organisational objectives. They have their own objectives which may conflict with those of the organisation as a whole. Galliers sums up the problem thus:

> What appears to be required is a technique which places information in the context of necessary activities, linked with organisational plans/objectives, differentiates between management and operational activity, bears in mind the different ways in which individuals might make similar decisions and their formal and informal information needs, but neither over-emphasises the existing organisational structure nor places over-reliance on an examination of the existing information system(s).

5.3 The Value Chain

Every firm or organisation is a collection of activities that are performed to design, produce, market, deliver and support its product. All these activities can be represented by using a value chain diagram as below:

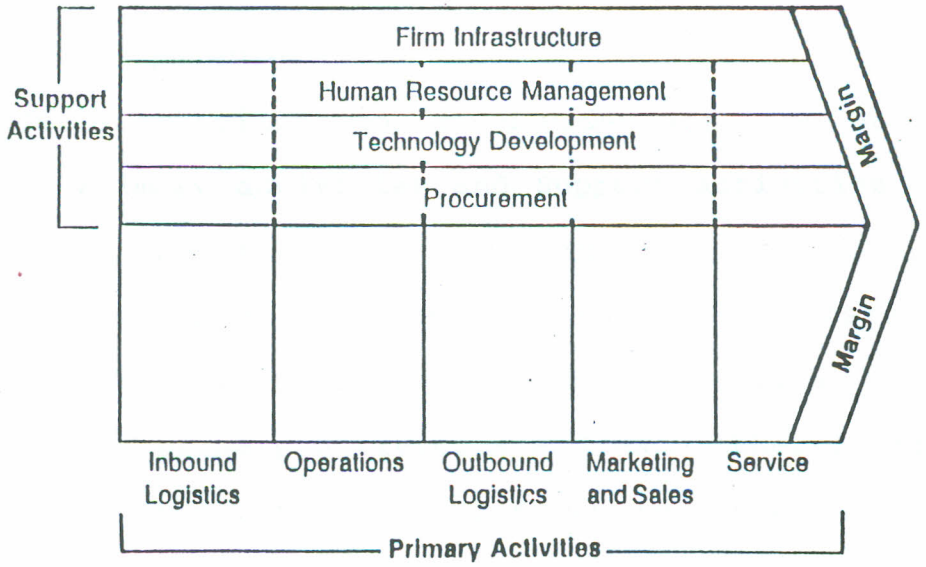


Fig. 5-2 Michael E. Porter's Value Chain

A firm's value chain and the way it performs individual activities are a reflection of its history, strategy and approach in implementing its strategy and the underlying economies of the activities themselves. The value chain displays total value, and consists of value activities and margin. Value activities are the physically and technologically distinct activities a firm performs. These are the building blocks by which a firm creates a product or service valuable to its buyers.

Every value activity employs purchased inputs, human resources (labour and management), and some form of technology to perform its function. Each value activity also uses and creates information, such as buyer data (order entry), performance parameter (testing), and product failure statistics. Value activities may also create financial assets such as inventory and accounts receivable or liabilities such as accounts payable.

Value activities can be divided into two broad types namely, **Primary activities and Support activities**. Primary activities are the activities involved in the physical creation of the product and its sale and transfer to the buyer, as well as after-sale assistance. Support activities support the primary activities and each other by providing purchased inputs, technology, human resources, and various firmwide activities. Identifying value activities requires the isolation of activities that are technologically and strategically distinct.

Primary Activities:

(i) Inbound Logistics--These are activities associated with receiving, storing, and disseminating inputs to the product, such as material handling, inventory control, vehicle scheduling, etc.

(ii) Operations--These are activities which are associated with transforming inputs into outputs. For example, machining, packaging, equipment maintenance, printing, etc.

(iii) Outbound Logistics--These are activities associated with collecting, storing, and physically distributing the product to buyers. For example, finished goods warehousing, delivery vehicle operation, order processing, etc.

(iv) Marketing and Sales--These are activities associated with providing a means by which buyers can purchase the product and inducing them to do so. For example, advertising, sales promotion, channel selection, pricing, etc.

(v) Service--These are activities associated with providing service to enhance or maintain the value of the product. For example, repair, trailing parts supply, etc.

Support Activities:

(i) Procurement--These are acquisitions of purchased inputs for use in the primary activities in the value chain. For example, selection of suppliers, formalisation of contracts, etc.

(ii) Product/Technology Development--These are activities meant to improve the product or service and the processes that make them possible. This focuses on technology in general.

(iii) Human Resource Management--This consists of activities involved in the recruiting, hiring, training, development and compensation of all types of personnel.

It supports both individual primary and support activities (e.g.hiring of engineers) and the entire value chain (e.g. labour negotiations).

(iv) Firm Infrastructure--This consists of a number of activities including general management, planning, finance, accounting, legal, government affairs and quality management. Infrastructure, unlike other support activities, normally supports the entire chain and not individual activities.

Although value chain activities are the building blocks of competitive advantage, the value chain is not a collection of independent activities but a system of interdependent activities. Value activities are related by linkages within the value chain. Linkages are relationships between the way one value activity is performed and the cost or performance of another.

5.4 Management of IS/IT

The main obstacle to implementing IS/IT in organisations (business or governmental) is not a lack of technology, but a lack of understanding on both sides of the desk. This is the view of American author and consultant Mary E. Boone who says, "managers don't understand what computers can do for them as leaders, and IT people (professionals and suppliers) have trouble understanding what executives want". What todays executive's clearly need is education in how computerised reporting can give them some advantage over others.

Different people in an organisation need different information and each should get what he/she needs. For example, executives are supposed to focus on the strategic direction of their organisation for analysis, and operational workers on routine operational information.

Organisations are normally dependent upon their IT for both their normal routine duties and also for their development and launch of new product and/or services. It is therefore essential for the continued successful operation of the organisations, that the availability, integrity and confidentiality of their IT systems and data are maintained, at levels which are appropriate to the organisation's requirements.

To ensure that IT systems can continue to operate, to keep information confidential and to maintain accuracy, a high level of IT security is required. Therefore, the concerned organisation is expected to follow standard procedures. It is important to note that successful operation of an organisation's IT security policy cannot be achieved without the wholehearted cooperation of every employee. The organisation should have contingency plans incase the IT system breaks down. Such contingency plans should cover: total or partial loss of computing equipment; loss of essential services such as electricity, water, telecommunications; total or partial loss of data or software; etc.

On the personnel side, the organisation should identify key positions and successors nominated so that there is

always atleast one potential successor for each key position. Employees should be recruited in accordance with the organisation's personnel recruitment procedures. The recruitment of employees for sensitive positions will require additional vetting of their previous employment and references in accordance with the nature of the position to be filled. The appraisal, promotion, training, internal transfer, disciplinary action and dismissal of employees will be conducted in accordance with the organisation's procedures regarding such matters.

Departmental Heads should be responsible for all computer equipment in their department and for the use of the equipment under their control. It is the responsibility of departmental heads to ensure that equipment is operated in accordance with the relevant organisation procedures and operating guidelines and used solely for organisation's purposes. Computer equipment should be secured when not in use to prevent unauthorised use.

All computer equipment is to be maintained in accordance with the supplier's recommended service intervals and according to their equipment specification. Repairs and servicing of equipment must only be carried out by authorised maintenance staff. A record must be kept of all faults or suspected faults in IT equipment. Any supplied software must be maintained by authorised persons. Such software shall be kept up to date in order to receive continued support. All premises must be constructed in accordance with the relevant planning, building, fire and safety regulations, recognised

good professional practice and according to an approved design drawn up by suitably qualified professional experts. And as already pointed out in other parts of this document, IT/IS factor in an organisation can only succeed if it gets the full support of top management and all employees of the organisation.

Chapter 6

Recommendations and Conclusion

6.1 MUC in the 21st Century

6.2 The Organisation and its Environment

6.3 Recommendations

6.4 Conclusion

6.1 MUC in the 21st century

From its development plan, MUC aims at having a planned growth which does not unnecessarily duplicate the already existing programmes in other public Universities. In the process of doing this, it aims at evolving a University with unique characteristics. The institution also aims at being medium sized with a student population of about 7,000.

In the short-term, MUC is concerned with income generating ventures for departments, centres, institutes and other relevant units. Similarly, MUC desires that its curricula should incorporate income generating ventures so that its graduates are practically oriented and capable of engaging in self-employment. MUC is also concerned about the manpower requirements of the country as evidenced by their commitment to offering postgraduate courses in various disciplines.

The planned start of centres like Creative and Performing Arts and African languages are indications that the University would be unique as such areas have not been covered by other public Universities. In the short term, MUC emphasises income generating ventures like offering sandwich courses to practising teachers, Education administrators, Headteachers and Principals.

The medium term programmes which will usher MUC into the 21st century appear to be giving more weight to the sciences. However, by the year 2005, MUC hopes to have the following programmes in operation:

(i) All the traditional faculties/departments of Arts based and Science based subjects

(ii) Faculty of Agriculture and Agrarian studies

(iii) Computer Science and Technology

(iv) Aquatic Sciences

(v) Energy Systems

(vi) A centre for Advanced Management Studies

(vii) A School of Communication and Media Sciences

(viii) Sandwich courses for various industries

(ix) A School of Medicine specializing in Medical Technology

(x) Faculty of Engineering emphasizing on Chemical, Sugar and Maintenance

(xi) Department of Space and Earth sciences

(xii) A fully fledged department of Education Technology

If MUC achieves most of its plans, then it is expected to be a strong medium sized institution that will have balanced courses. It would be unique as planned and able to equip the students with practical knowledge that would see most of them self-employed after graduation. Some of its plans appear expensive, difficult and far-fetched; although with dedication, proper planning and discipline they are not impossible to achieve.

With the student and staff populations of 7,000 and 2,500 respectively, MUC will require the support of IT/IS to be efficient and effective. The University is bound to have several campuses specializing in different areas. All these campuses would require networks with each other as they will

be located in different places geographically. And since they will require the functional services of finance, personnel, purchasing and others, they will be in dire need for computer links with the central administration and other departments.

By the year 2005, MUC is expected to have forged a lot of links with industry for research purposes. The departments that would be involved in such research would require the support of computer networks that would allow them to quickly transfer research findings to the industries with which they are involved and vice versa. Therefore, computer links will be an integral part of various departments. And for MUC professors and researchers to exchange ideas with their counterparts in the Western world, they require IS/IT support and network links. Information highway will have to be opened to allow various institutions of the world to share and communicate their research findings.

It is also envisaged that all the public Universities in Kenya will have a centralised computer system that will support the University selection exercise by the year 2005. This will save the Universities huge amounts of money used to manually carry out the exercise. In fact, the amounts used by various Universities and their constituent colleges annually could have been pooled to create a central database for selection of candidates. And assuming that the JAB activities would be computerised by the year 2005, then each public University, would be expected to have a LAN that would allow it to get the lists of admitted candidates on-line.

As discussed earlier, this would reduce running costs of selection to each University and create efficiency and effectiveness.

6.2 The Organisation and its Environment

An organisation's environment and general environment are basically the same. The latter includes everything, such as economic factors, political conditions, the social milieu, the legal structure, the ecological situation and cultural conditions. The general environment encompasses conditions that may have an impact on the organisation, but their relevance is not overtly clear.

The specific environment is that part of the environment that is directly relevant to the organisation in achieving its goals. Each organisation operates within and faces its own environment which is specific to its mission, performance and effectiveness. In the same way that an organisation is influenced by its specific environment, the organisation can also influence its environment in one way or the other by influencing the constituencies within. Organisations exploit a number of means to help them influence target areas in the environment to effect favourable changes. But on top of the list is information technology which, if properly used, can support any moves to ultimately help the organisation to fulfil its strategy and achieve its objectives.

Below is a figure of an organisation's specific environment:

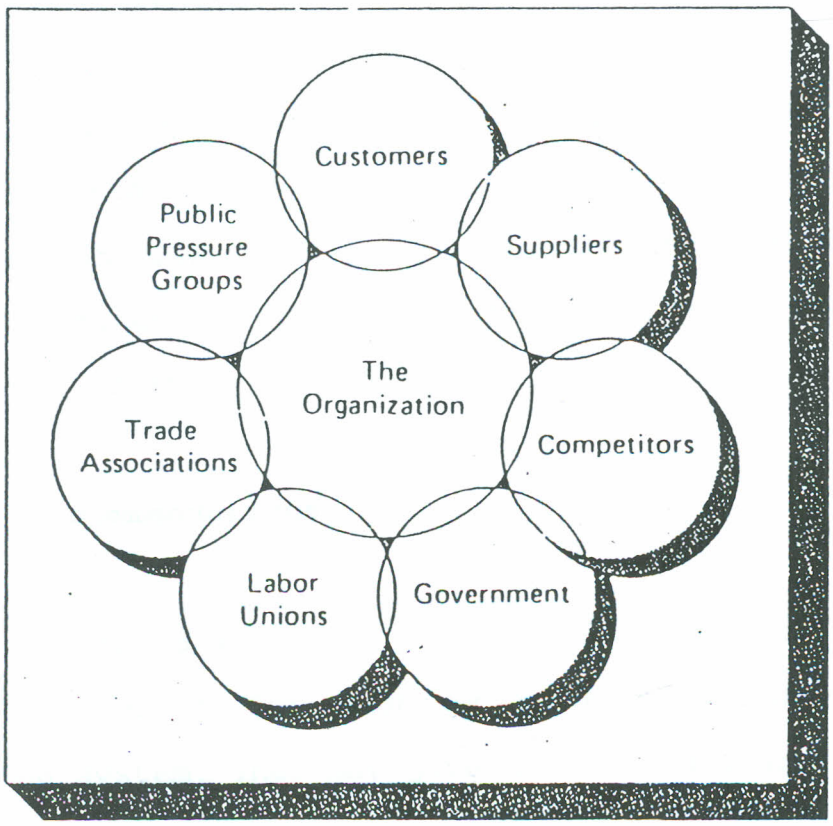


Fig. 6-1 S.P.Robbins: The Organisation and Its Specific Environment

An organisation's specific environment will vary depending on the domain it has chosen.

Domain refers to the claim that the organisation stakes out for itself with respect to the range of products or services offered and markets served. It identifies the organisation's niche. For example, Volkswagen and Mercedes are both German firms that manufacture automobiles, but they operate in distinctly different domains. Similarly, Kenyan Universities offer slightly different courses and those differences make each one of them appeal to different segments of the higher-Education market. For example, University of Nairobi specializes in law, medicine, architecture and commerce whereas Moi University specializes in forestry, environmental science and industrial technology.

6.3 Recommendations

The following recommendations should be considered by the MUC management for adoption when building a modern information system. They may give MUC a good start:

(i) Checkland's Soft Systems Methodology for information needs analysis. This is already discussed in chapter 5 section 5.2

(ii) Systems Development Methodology by James Martin, for implementation of information needs.

(iii) Structured Design Methods for building technical systems.

(iv) The right Human requirements in Technical Development (Implementation and Support).

(v) Cost-Benefit Assessment.

(vi) Systems Compatibility (Standardisation).

(vii) Management of Information Resource.

(viii) Joint Effort Approach by all public Universities.

(ii) Systems Development Methodology

Information Engineering is a comprehensive system development methodology which provides techniques for identifying and organising business requirements at the highest possible level. Based on those requirements, it provides tools for building application systems to satisfy them.

To achieve these, information Engineering is divided into seven stages as follows:

1. **Information Strategy Planning (ISP)**, in which the developer establishes a broad view of the information requirements of the business.
2. **Business Area Analysis (BAA)**, in which the developer performs a more detailed analysis on a particular segment of the business called a business area.
3. **Business System Design (BSD)**, in which the developer describes an application system supporting a segment of a particular business area in detail without regard to the particulars of the target computing environments.
4. **Technical Design (TD)**, in which the developer tailors the results of Business System Design to a specific target computing environment.

In this stage, the developer considers the characteristics of the hardware environment, operating system, teleprocessing monitor, and data base management system.

5. **Construction**, in which all of the executable components of a system are created. Included in this process are development programs, data bases, job control statements, screen formats, transaction definitions, etc.

6. **Transition**, in which a newly constructed application system is installed in a production environment in an orderly manner, possibly replacing existing systems or portions of systems.

7. **Production**, in which the enterprise realises the full benefit of the application system as it executes to satisfy some portion of the business requirements identified during ISP.

In practice, Information Engineering has proven appropriate for many categories of enterprise. Although some of the terminolgy may seem slanted towards business concerns, the techniques employed are suitable for use by public agencies and non-profit organisations as well. Information Engineering approach involves the end-users of the systems at all stages of development and implementation.

(iii) Structured Design Methods

Structured design methods provide a well documented and consistent set of procedures by which technical systems can be created. These formal methods include a number of important innovations, for example, an emphasis upon

describing the entities the system deals with as well as the processes in the application. By formally requiring documentation in specific forms at all stages, these methods also inject discipline into change control, i.e. when one part of the system is changed the consequences for interdependent parts are thoroughly examined and the outcome is recorded in a form readily understood by other designers. These and other changes mean that these methods now provide a means by which large-scale, complex software developments may be managed with some confidence.

Some of the best known examples of these methodologies are the Jackson Methodology (Jackson,1975), LSDM (Learmouth Structured Development Methodology) (Burchett, 1985) and SSADM (Structured Systems Analysis and Design Methodology) (Cutts, 1987)

One of the concepts embedded in these methodologies is the customer-contractor relationship, i.e. the customer is perceived as commissioning the design team to develop a system to meet specified requirements. At various stages in the process, the designers are obliged to provide the customer with evidence of progress and customers are empowered to assess the progress; design cannot proceed until they are satisfied that the resulting system will be in accord with their requirements.

It is true that developing one's system can be more expensive than purchasing commercially available packages.

Research indicates that most organisations now prefer to buy off-the shelf commercial packages that meet most of their requirements.

(iv) Human Requirements in Technical Development (Implementation and Support)

Implementation is the acid test in many ways. If the process of implementation is effective, it will end with a technical system able to support the work to be done, a social system that has adjusted to exploit the technical system and a population of users able and willing to use the technical system. Consequently, some goals must be achieved in parallel during implementation. Some of the goals are:

(a) Loading, Testing and Validating the Technical System--This is the stage when the system is loaded with real data to be used for real tasks.

(b) Local Design--Within the overall design there will be many design decisions that can be taken at the time of implementation; tailoring the software to meet individual needs, organising workstations and room layouts, etc.

(c) Organisational Change--Issues to consider will include: task allocation, rosters, reporting arrangements, demarcation agreements, pay and grading and other conditions of service--many with industrial ramifications. Other organisational issues to consider could be: who has access to which parts of

the system, who may up-date data bases, who has responsibility for start up and maintenance of the system, etc.

(d) Accceptance of Change--If people are to use the system effectively they need a positive attitude towards it.

(e) Training and Support--The technical system and any new social structures require people to use them who understand them, have the skills to operate them and feel confident in the use of these skills. The provision of training and other ways of helping people adjust to change is a major part of implementation.

(f) Maintaining the Integrity of Throughput--The changes listed above are daunting in themselves but in many organisations the implementation is made much more difficult because it must be accomplished whilst staff go about their normal business serving customers, making products, etc. Most information technology systems are introduced into on-going operations which must maintain the level and quality of the throughput throughout the transition.

(v) Cost-Benefit Assessment

Things to consider here include:

(a) Systems Specification--Stating the technical proposal in a form which facilitates the assessment of organisational change

(b) Organisational Specification--Outlining that part of the organisation which will be affected by the system and describing the actual or planned work roles that will be occupied by users of the system.

(c) User Cost-Benefit Assessment--An assessment of the impact of the system upon the major work roles of potential users.

(d) Organisational Match Assessment--An assessment of the overall impact upon the organisation.

(e) Socio-technical Design--A series of check-lists to support the development of a strategy for the development of an acceptable socio-technical system.

(vi) Systems Compatibility (Standardisation)

The organisation should aim at having systems (software and Hardware) which are standard and compatible with other systems. This would make linkages and extensions easier. Computers from different vendors should be able to interface with each other in a standardised LAN system.

(vii) Information Resource Management

The degree to which an organisation standardises its information flows and uses integrated information systems as a control mechanism is an issue to be determined by management rather than technologists because it is in part a matter of management philosophy. Some organisations have to be tightly integrated because what happens in one part directly affects other parts.

For example, managing a fleet of aircraft, an oil refinery or a manufacturing facility needs careful integration. By contrast there are organisations where the parts are loose affiliation, for example, the departments of a University, where a greater degree of autonomy at a local level can be acceptable.

(viii) IT/IS Joint Effort Approach by all Kenyan Public Universities

MUC and other Kenyan public Universities should pool resources to: computerise the selection process; buy expensive databases for learning, teaching and research; etc. This is how the counter-parts in the Western world are managing.

6.4 Conclusion

IT/IS enables us to build effective information systems. Each organisation has various activities carried out in various functional areas. With a computer, the user can manipulate accounting and management information to test the effect of alternate strategies and evaluate the reason for current business results; compress large volumes of data into a single graphic display that shows trends in vivid colours, transmit and receive files of information from one end of the country to the other in seconds; prepare reports, proposals and correspondences,making rapid revisions as needed and automatically print the result much faster than a human typist.

The emphasis on systems means that the various components seek a common objective of supporting organisation activities.

Data communications is perhaps the most dynamic in the last decade. From the 1970s, the industry has seen significant changes in costs, competition, hardware and software; changes that have provided the impetus for more systems to be implemented. The low price of communications equipment such as modems and processors have made computers and data communications an integral part of both private and professional life.

Many problems in computerising work result from failing to take into account the objectives, views and interests of all those with a stake in the outcomes of "going hi-tech". The Soft Systems approach by Checkland tries to overcome this.

Computers and data communications have already had an impact on the work environment. Inter-office correspondent, image, voice, and video transfer and portable devices all play a significant role in shaping how organisations communicate. Faster processors, improved problem statement and problem solving languages, together with data communications, have the potential of altering the world's current business and education processes. Computers and data communications bring a potential for social change equivalent to that brought about by the telephone and the automobile.

At MUC, the achievement of academic, administrative and business goals is primary.

In its attempt to have a computer based information system,MUC needs to develop an information model. This could be the use of one of the Systems development methodologies to give it a long-lasting solution to its information needs. And once built, proper management of the system should be instituted to ensure continuity, confidentiality and integrity of information.

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