

**THE USE AND SUSTAINABILITY OF  
INFORMATION TECHNOLOGY (IT)  
IN ACADEMIC AND RESEARCH  
LIBRARIES IN TANZANIA.**

**By**

**Desdery Rutalemwa Mushumbusi Katundu**

**Dipl. Education, Dar-es-Salaam College of National Education, Tanzania, 1978**

**BA Ed. (Hon.), University of Dar-es-Salaam, Tanzania, 1983**

**MA (Lib.& Inf. Stud.), Loughborough University of Technology (UK), 1986.**

**Submitted in fulfilment of the academic requirements for the degree of Doctor of  
Philosophy in the Department of Information Studies, University of Natal,  
Pietermaritzburg, South Africa, 1998.**

# DECLARATION

I hereby declare that unless specifically indicated to the contrary in the text, this dissertation is my own original work and has not been submitted to any other university for a similar or any other degree.

Desdery Rutalemwa Mushumbusi Katundu.

Signed :



Supervisor : Professor Andrew M. Kaniki.

Signed :



# ABSTRACT

The main purpose of this study was to investigate the current status of information technology (IT) and strategies which academic and research libraries in Tanzania can adopt in order to facilitate the sustainability of information technology which has been acquired through external donor assistance. The motivation for undertaking the study emanated from the researcher's long working experience of twelve years in a university library. Through this experience it has been observed that many of the donor-funded or supported information projects like the introduction of information technology in libraries, thrive well and offer good information services when donor support is still available. However, once the donor project or donor support comes to an end very few of these have been able to continue delivering the intended information services and products. What this implies, is that very little is known by both donors and recipient libraries alike about factors or strategies which can affect the future sustainability of such donor-funded information projects in libraries. The study assumed that if information technology is effectively sustained it would reduce the vulnerable dependence of libraries on donor funding and support, and in turn facilitate effective local planning and development of the technology and related information services which responded to the needs of the library clientele.

Eighteen libraries possessing and using some form of information technology were studied. The survey research method comprised the questionnaire; interview schedule and observation through visits as data and information gathering instruments was used in the investigation. Its selection was determined by the under-researched nature of the problem. Data and information generated by the instruments was content analyzed and formally presented by the use of descriptive statistics.

The major findings of the study revealed that despite donor support to libraries, the status of information technology reflected early stages of its introduction in almost all the libraries. No all-round IT infrastructural development existed. Shortages or non-availability of various IT equipment and accessories resulted in differences in the quantity of the technology possessed by each of the libraries studied. Consequently, effective use of the technology was

hampered by the scarcity or inadequate availability of the equipment and accessories as well as limited IT skills, knowledge and competence among library staff. While all the libraries indicated that they had great needs for IT training, the levels at which it was required differed from one institution to another. As a result, not many of the IT-related information needs were currently being satisfied.

The findings also reflected positive concurrence on the feasibility of IT sustainability by the libraries. Most of the libraries agreed that despite being under-resourced, the sustainability of information technology based upon own library resources could be feasible provided all or most of the proposed sustainability strategies were effectively and concurrently implemented by the libraries. Proposed sustainability strategies have been presented in the study. These could be conceived within three broad categories namely, strategies related to: the need for adequate resource-generation, formulation of IT policy informed by effective IT planning and management practices, and the enhancement of the role and value of information and related services as vital elements for its adequate support. All these strategies affect library parent organization managements, library managements and professionals as well as donors of the technology. The study concludes that libraries need to become more involved in charting out the required direction of IT development which would ensure the availability of adequate and appropriate technology in response to user needs and its effective sustainability. This would involve improvement of the status of IT; formulation and actual implementation of IT policies and planning ; the need for continuous assessment of user needs , and effecting continuous IT education and training in libraries. The recommendations and areas for further research put forward by the study were based on the implications reflected by the study findings.



# ACKNOWLEDGEMENTS

Successful completion of this study would have been impossible without the support of many individuals and institutions. I would therefore like to express my sincere gratitude to the following:

- The Swedish Agency for Research Cooperation with Developing countries (SAREC-Sweden) which through the University of Dar-es-Salaam, financially supported my studies.
  
- The University of Dar-es-Salaam granting me four-years paid leave.

I also extend many thanks to my main supervisor Professor Andrew M. Kaniki for his untiring academic guidance, inspiration and constructive comments during the entire course of this study. Not forgotten are the entire staff of the Department of Information Studies, who in different ways have encouraged and helped me in my work.

Lastly to my family, particularly Sophia and our sons Kalamagi, Dismas and Didas. All these understood, accepted and tolerated my absence for the entire period of my studies.

# TABLE OF CONTENTS

ABSTRACT .....	i
ACKNOWLEDGEMENTS .....	iii
LIST OF TABLES .....	viii
LIST OF ACRONYMS AND ABBREVIATIONS .....	ix
<b>CHAPTER 1: INTRODUCTION TO THE STUDY .....</b>	<b>1</b>
1.1 Introduction .....	1
1.2 Background to the problem .....	3
1.3 Statement of the problem .....	9
1.4 Purpose and objectives of the study .....	11
1.5 Research questions .....	12
1.6 Definition of key terms .....	13
1.7 Scope and limitations of the study .....	14
1.8 Significance of the study .....	15
1.9 Summary .....	17
1.10 References .....	19
<b>CHAPTER 2: REVIEW OF RELATED LITERATURE .....</b>	<b>22</b>
2.1 Introduction .....	22
2.2 Sustainability : its historical origins .....	22
2.3 Donor agencies and sustainability .....	26
2.4 Relevance of sustainability to recipient libraries .....	31
2.5 Problems and / or strategies affecting sustainability .....	33
2.6 Summary .....	49
2.7 References .....	51

<b>CHAPTER 3:</b>	<b>RESEARCH METHODOLOGY</b>	<b>56</b>
3.1	Introduction	56
3.2	Research design	57
3.2.1	Data collection instruments	58
3.2.1.1	The questionnaire	59
3.2.1.1.1	Design of the questionnaire	60
3.2.1.2	The interview schedule	63
3.2.2	Pre-testing of the research instruments	64
3.3	Population of the study	65
3.4	Administration of the research instruments	69
3.5	Data analysis	70
3.6	Summary	72
3.7	References	74
<b>CHAPTER 4:</b>	<b>PRESENTATION OF RESEARCH RESULTS</b>	<b>76</b>
4.1	Introduction	76
4.2	General background information on the libraries	78
4.2.1	Nature of libraries	78
4.2.2	Number of registered users	80
4.2.3	Categories of users	82
4.3	Status of information technology in libraries	84
4.3.1	IT hardware: numbers, types and makes or brands available	84
4.3.2	Systems and applications software packages	86
4.3.2.1	Systems software packages	86
4.3.2.2	Applications software packages	87
4.3.3	Types of makes or brands: computers; printers and CD-ROM drives	89
4.3.4	IT acquisitions trend, 1976-1996: computers and printers	92
4.4	Information technology policies, planning and funding	95
4.4.1	Sources of IT funding: external (donor) sources	95
4.4.2	Sources of IT funding: local (library's own) sources	98
4.4.3	Donor agencies supporting IT among libraries	102

4.4.4	Factors influencing donor support to libraries .....	104
4.5	Information technology policies on selection and use .....	105
4.5.1	IT selection and use procedure in libraries .....	105
4.5.2	Functions or activities for which IT was used .....	108
4.5.3	IT skills, knowledge, competence and training needs .....	109
4.6	Sustainability of information technology in libraries .....	110
4.6.1	Feasibility: problems and strategies .....	110
4.6.2	Identification of IT sustainability strategies in libraries .....	111
4.6.3	Problems (and solutions) affecting IT sustainability .....	113
4.6.4	Basic conditions or requirements for IT sustainability .....	116
4.6.5	General comments on IT sustainability .....	118
4.7	Summary .....	120
4.8	References .....	123
<b>CHAPTER 5:</b>	<b>DISCUSSION OF RESEARCH RESULTS .....</b>	<b>124</b>
5.1	Introduction .....	124
5.2	Answering the research questions .....	125
5.2.1	Current status of information technology in libraries .....	126
a)	Hardware, software and IT accessories .....	126
b)	Status of IT human resources and IT use .....	132
5.2.2	Manner of IT acquisitions, financing, maintenance and sustainability ...	136
5.2.3	Policies determining IT use in libraries .....	140
5.2.4	Problems affecting IT use and its sustainability .....	144
5.2.5	Strategies for effecting information technology sustainability .....	149
5.3	Summary .....	153
5.4	References .....	155
<b>CHAPTER 6:</b>	<b>SUMMARY, CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>158</b>
6.1	Purpose of the study .....	158
6.1.1	Research design and methodology .....	160
6.1.2	Population of the study .....	161
6.1.3	Analysis and presentation of data .....	162
6.1.4	Summary of the study findings .....	164

6.2	Conclusions .....	167
6.2.1	Status of information technology .....	168
6.2.2	IT policies and planning .....	170
6.2.3	Levels of information technology use .....	170
6.2.4	IT education and training .....	171
6.2.5	IT sustainability strategies .....	172
6.3	Recommendations .....	173
6.4	Suggestions for further research .....	176
6.5	References .....	179
<b>BIBLIOGRAPHY .....</b>		<b>181</b>
<b>APPENDICES .....</b>		<b>191</b>
<b>APPENDIX A        LETTERS OF INTRODUCTION .....</b>		<b>191</b>
A1	Letter from the Head of Department of Information Studies, University of Natal .....	192
A2	Letter from the Vice Chancellor, University of Dar-es-Salaam .....	193
A3	Proforma letter from researcher .....	194
<b>APPENDIX B        RESEARCH INSTRUMENTS .....</b>		<b>195</b>
B1	Survey questionnaire .....	196
B2	Interview schedule .....	209
<b>APPENDIX C        ADDRESSES OF LIBRARIES .....</b>		<b>211</b>
C1	Addresses of libraries involved in the study .....	212

# LIST OF TABLES

<b>TABLE 1:</b>	<b>Projects with information technology components funded by international organizations in developing countries .....</b>	<b>6</b>
<b>TABLE 2:</b>	<b>Nature of libraries .....</b>	<b>79</b>
<b>TABLE 3:</b>	<b>Numbers of registered users .....</b>	<b>80</b>
<b>TABLE 4:</b>	<b>Categories of users served by individual libraries .....</b>	<b>83</b>
<b>TABLE 5:</b>	<b>Information technology hardware in libraries .....</b>	<b>85</b>
<b>TABLE 6:</b>	<b>Systems software packages in libraries .....</b>	<b>86</b>
<b>TABLE 7:</b>	<b>Applications software packages in libraries .....</b>	<b>88</b>
<b>TABLE 8:</b>	<b>Types of computer models, makes or brands in libraries .....</b>	<b>90</b>
<b>TABLE 9:</b>	<b>Types of models or makes of printers .....</b>	<b>91</b>
<b>TABLE 10:</b>	<b>Types of models or makes of CD-ROM drives .....</b>	<b>91</b>
<b>TABLE 11:</b>	<b>Information technology acquisitions trends: 1976 -August, 1996: computers and printers .....</b>	<b>93</b>
<b>TABLE 12:</b>	<b>Sources of IT acquisitions funds .....</b>	<b>97</b>
<b>TABLE 13:</b>	<b>Approximate annual budgetary allocations in library .....</b>	<b>99</b>
<b>TABLE 14:</b>	<b>Factors or reasons for insufficient library budgets .....</b>	<b>101</b>
<b>TABLE 15:</b>	<b>Donor support in terms of the number of libraries .....</b>	<b>103</b>
<b>TABLE 16:</b>	<b>Donor organizations and libraries supported .....</b>	<b>103</b>
<b>TABLE 17:</b>	<b>Factors influencing donor support to libraries .....</b>	<b>105</b>
<b>TABLE 18:</b>	<b>Decision-makers on IT functions in libraries .....</b>	<b>107</b>
<b>TABLE 19:</b>	<b>Broad categories of IT training needs .....</b>	<b>110</b>
<b>TABLE 20:</b>	<b>Proposed strategies for achieving IT sustainability in libraries .....</b>	<b>112</b>
<b>TABLE 21:</b>	<b>Problems affecting IT use and sustainability in libraries .....</b>	<b>114</b>
<b>TABLE 22:</b>	<b>Basic conditions or requirements for IT sustainability .....</b>	<b>118</b>

## LIST OF ACRONYMS AND ABBREVIATIONS

AAAS	American Association for the Advancement of Science
ACBF	African Capacity Building Foundation - Harare
APAS - US	Environmental Protection Agency of the United States of America
CTA	Technical Centre for Agriculture and Rural Development (Centre Technique de Cooperation Agricole et Rural)
DANIDA	Danish International Development Agency
ENFO	The Environmental Information Service (Ireland)
ERNESA	Project on: Educational (information) Research Network involving eastern central and southern Africa countries funded by IDRC- Canada. (ERNETA part of ERNESA but specific for educational information research in Tanzania)
FAO	Food and Agriculture Organization (of the United Nations)
GEMS	Global Environmental Monitoring Systems (of the United Nations Environmental Programme (UNEP))
GTZ	The German Society for Technical Cooperation
HIVOS	Humanistic Institute for Cooperation with Developing countries (Netherlands)
IFAD	International Fund for Agricultural Development (Washington)
IDRC	International Development Research Centre - Canada
ISNAR	International Service for National Agricultural Research
NCR	National Cash Register - Computer branch company represented in Tanzania.
NORAD	Norwegian Agency for (international) Development
ODA (UK)	UK's Overseas Development Administration
RECOSCIX-WIO	Regional Cooperation in Scientific Information Exchange-Western part of the Indian Ocean. It is an aquatic/marine research information exchange network among marine research institutes in the Indian ocean supported by the Belgium government and the International Oceanographic Commission (IOC) of the United Nations.

SAREC	Swedish Agency for Research Cooperation with Developing countries
SIDA	Swedish International Development Authority
SNV	Schweizerische Notarenverband (Netherlands)
USAID	United States Agency for International Development
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization.



# CHAPTER 1

## INTRODUCTION TO THE STUDY

### 1.1 Introduction

This chapter sets the subject for research in context beginning with a general introduction leading to a discussion of the background information on the problem. The discussion identifies and elucidates what the problem is followed by the purpose and objectives of the study. Research questions guiding the study are identified, together with the definition of key terms it has used. The scope and limitations of the study are also discussed followed by the methodology and techniques applied in data collection. The chapter concludes with a discussion on the population of the study, and its broad relevance in relation to adoption, use and sustainability of information technology, especially for academic and research libraries and information centres in Tanzania.

Of the many technologies which are now available in Africa, information technology (IT) is already making noticeable positive and negative impacts in all spheres of human life, including the library and information services. Studies on the impact of information technology have been conducted in Africa and the world over. Among these which provide a comprehensive coverage of the impact of information technology are studies by Cole (1986), and Hall (1994) for example, who have examined the impact of IT at global level, while Chisenga (1995) as well as Zulu (1994) have done the same with particular reference to Africa. One of the most important impacts has been the speedy generation, storage, retrieval, and dissemination of information which before was almost impossible through manual means. Such processed information has been the key to the economic, social and cultural development of nations. The role and significance of information technology in the general development of humankind can therefore no longer be ignored even by developing countries which are facing a multitude of social, economic as well as political problems in attaining overall development. Cole (1986:1273) for example, considers the importance of information

technology in the production process as being very crucial and more important than just “ordinary capital” we know of. This is true given IT’s capability to create new knowledge or information which is currently known as “knowledge capital”. Knowledge capital could be referred to new information or knowledge created with the use of information technology which allows an individual or a country to have competitive advantage over others in the creation of new products or services which could be turned into commodities and hence create wealth. Knowledge capital is thus becoming more significant and required for the combination and integration with other ordinary forms of capital in the production or creation of wealth necessary for any country’s development. Cole (1986:1273) points out that information technology:

... has been a generator of “knowledge capital” which is wealth, and a new type of capital which may be more important in the economic future than ordinary capital (1986: 1273).

Developing countries are therefore reminded and cautioned not to ignore the role and importance of information technology in the development process that:

...the underdeveloped countries of the world today are those which came late to the industrial revolution: the underdeveloped nations of the future will be those which came late to the information revolution (Zulu, 1994: 80).

In the case of academic and research libraries in developing countries, information technology combined with the rise of facilities such as the Internet is providing for them the potential of providing and facilitating cost-effective delivery of information services. This is bridging the gap isolating researchers, academics and practitioners from accessing up-to-date information required for further research, education and development programmes. As such, information technology is therefore strengthening and enhancing the generation of, and increasing access to the much needed information resources such as on-line information services for the clients. It is also strengthening the organization and management of information for easy access, as well as assisting libraries with access to vital management information required for informed decision-making in the efficient use of resources to provide effective information services and products.

## 1.2 Background to the problem

This study does not intend to “re-invent the wheel” by re-examining the impact of information technology, which, as seen earlier, has been dealt with by other studies. It therefore sets out to investigate the feasibility for academic and research libraries in Tanzania to attain the capacity and capability to sustain the information technologies they currently use or that they may acquire in the future. This is an issue which has so far not been adequately and systematically addressed. The assumption upon which this study was based has been that if information technology is sustained and properly utilized it can positively contribute not only to the provision of effective information services but also to overall national development. Given that the acquisition of the technology by the libraries has largely been dependent upon donor assistance, the issue of IT sustainability therefore becomes critical for libraries if long-term utilization of the technology in their information services is to be guaranteed.

Tanzania like many developing countries has, and continues to use, information technology in various social, economic, and cultural spheres in order to facilitate the country’s development. Specifically, Tanzanian academic and research libraries have and continue to use technology in their operations. In effect, information technology has already proved to be a vital adjunct in the provision of information services. Currently, these libraries are capable of offering a variety of up-to-date information services as a result of the use of the little information technology which is available. However, most of this technology has been and continue to be obtained largely from external donor assistance in the form of either aid, donations, gifts or grants from international organizations. Major donor agencies in this support to libraries have included: the American Association for the Advancement of Science (AAAS); the Carnegie Corporation of New York; the Finnish International Development Agency (FINNIDA); the Swedish Agency for Research with developing countries (SAREC); the World Health Organization (WHO); the Health Foundation-New York; the International Development Research Centre (IDRC-Canada). The situation is probably best summarized by Rosenberg (1996:43), who surveyed 18 university libraries in

eleven African countries concentrating on their current state and future potential to offer quality and adequate information services to their clients in view of declining resources. She observed that the dependence on external donor assistance by African university libraries was the norm rather than the exception. The same dependence affected almost all aspects which contributed to the provision of library and information services to their clients. Her assertion confirms how strongly dependent on external donors academic as well as research libraries in Africa are. One can extend the argument that in virtually all aspects of information generation and provision, including the acquisition and eventual sustainability of information technologies by these libraries are determined by their heavy dependence on external donors. She asserts:

It is not in the realm of (book and journal) acquisitions that libraries in Africa are donor dependent. Virtually all new initiatives...whether the acquisitions of photocopiers, computers, staff training, new buildings or the development of new services, like CD-ROM searching; E-Mail; establishment of networks and databases...are the results of outside (donor) assistance (Rosenberg, 1996 : 43).

This state of affairs is not peculiar to Tanzanian libraries, but cuts across many African (and other developing) countries. Levey (1991;1993) for example, also noted that donor assistance in information technology to African academic and research libraries has been widespread in many African countries from the early 1980s to the present. Countries where such donor-supported IT projects were in progress included Cameroon, Ethiopia, Ghana, Malawi, Mozambique, Nigeria, Sierra Leone, Tanzania, Zambia and Zimbabwe. Similarly, the International Development Research Centre-Canada was reported to have been supporting about 94 information-related projects since 1988, which were widespread throughout Africa, with heavy concentration in the Sub-Saharan region. (Akhtar and Melesse, 1994: 316-318). The same was also true for the Carnegie Corporation and Ford Foundation of New York, both of which through the American Association for the Advancement of Science,(AAAS) accounted for eleven information technology projects in academic and research libraries in Africa. (African Regional Centre for Technology (ARCT), 1993). Other donor organizations, like the United States Agency for International Development (USAID); the United Nations Development Programme (UNDP); the Food and Agriculture Organization (FAO); the World Bank; the United Nations Industrial Development Organization (UNIDO) - just to mention a

few, have also provided and supported information technology for projects in developing countries. Table 1 provides a partial impression of the exponential growth of donor-supported projects with information technology components in developing countries. Although a composite picture of such donor-assisted information projects is generally lacking, a survey conducted by Schwere and Choudhury (1988) indicated over 260 projects supported by the World Bank alone with information technology components in 63 countries (mostly developing) in last two decades. As indicated also by Schwere and Choudhury (1988), Camara (1990), Levey (1993), Priestley (1993) and the African Regional Centre for Technology (1993), donor support for information technology has continued to rise tremendously.

Despite the fact that all these donor organizations do realize the importance of information systems and information technology in particular, most of them however, have treated IT as a tool that supports projects in other traditional sectors such as agriculture, energy, education and health. The recognition of information technology as an important sector in its own right, which needs to be supported on its own, for its overall development in developing countries, has never been emphasized. This fact might help to account for the patchy, lop-sided and unsystematic development of information technology infrastructure found in most of the libraries and other institutions in developing countries such as Tanzania.

One of the major consequences of donor dependence has been that donor support to information technology has in many cases tended to be sporadic and uncoordinated. As a result, it has often created numerous problems related to effective use of the technology, let alone the whole issue of its future sustainability after the end or termination of donor support to such projects. Related to these problems Camara (1990:56) for example, has observed and confirmed that among other factors, donors themselves could be partly responsible for the failure and hence, non-sustainability of many donor-supported information technology projects. Camara's observation was based upon issues involving rivalry and competition among the donors themselves, the nature of aid or support being a "one time-off investment" which rarely guarantees the future sustainability of the support given and the limited period or duration (mostly of three to five years) within which such projects were implemented. He

therefore claimed that:

The insufficient inter-agency consultation or coordination has led at times to a form of competition among donors which reduced their effectiveness. In addition, short-term aid...put many African institutions in difficult financial positions before new systems and services had a chance to become fully operational and demonstrate their usefulness ( Camara, 1990:56).

**TABLE 1: Projects with information technology components funded by international organizations in developing countries**

Donor organization	Projects with IT components supported	Expected duration	Countries assisted
Carnegie / Ford Agency for International Development (US) / American Association for the Advancement of Science (AAAS). [1]	Eleven (11) IT projects in academic and research libraries.	From 1987 - (continuing)	Kenya; Nigeria; Tanzania; Sierra Leone; Zimbabwe.
Swedish Agency for Research with developing countries (SAREC) / Swedish International Development Agency (SIDA) - Sweden. [2]	Twenty (20) projects with IT components.	Since 1985 - (continuing)	In 20 University and research libraries in Ethiopia; Nicaragua; Tanzania; Uganda; Vietnam; Zimbabwe.
International Development Research Centre (IDRC) - Canada. [3]	Over One hundred and twenty (120+) projects with IT components.	Since 1980 -	In Sub-Saharan African countries.
United Nations Development Programme (UNDP) [4]	One thousand five hundred (1500) projects with IT components.	Since 1986 -	Scattered world-wide with heavy concentration in developing countries.
The World Bank [4]	Over one hundred and sixty (160+) projects with IT. An addition of 30% new projects with IT components is noted since 1986 onwards.	Since 1986 -	Scattered world-wide but mainly in developing countries.

Sources : [1] Levey (1993: 6-7); and African Regional Centre for Technology (ARCT): Dakar (1993: 2-77) .

[2] Priestley (1993: 8-9).

[3] Camara (1990: 55-57).

[4] Schware and Choudhury (1988: 147-152).

Although there have been mixed reactions concerning the role of donors in Africa and other developing countries in general, donor assistance or support in Tanzania and Africa as a whole, and in academic and research libraries in particular, was a necessary and vital intervention since the 1980s as a result of a number of factors (Mlambo, 1993; Jinabhai, 1995). These factors had included firstly, the government's forced cut-back on social services expenditure particularly on education and research; and secondly, the austerity measures associated with the International Monetary Fund and the World Bank's Structural Adjustment Programmes (SAPs). As a result, these factors created economic and especially fiscal hardships among African libraries in acquiring even the basic academic literature, let alone the acquisition of information technology for information processing and handling. This situation has been ascertained by Priestley (1993:3) that donor interventions to assist academic and research libraries in Tanzania and other African countries was crucial as it facilitated:

...an initiative to provide and meet the immediate information needs of scientists and scholars, and improve the capacity of those libraries to serve their constituencies, as a result of their inability to cope with declining (sometimes erratic) levels of funding (Priestley, 1993: 3).

Caught up in this vicious cycle of declining resources on the one hand and the demand to provide information services for teaching and research on the other, recipient libraries have had no other viable option but to accept whatever assistance was made available. It was for these reasons that libraries appeared to have had no time for effecting careful planning in creating appropriate IT environments, and exploring alternative strategies which could have taken into consideration the issue of IT's future sustainability in their libraries. Furthermore, planning by libraries for the type of information services for which information technology was going to be used was also difficult. This is because not enough time was available for them to thoroughly engage in the proper identification of user needs which could be satisfied by the acquired technology. The absence of effective IT planning among most of the libraries therefore created a situation of "dependence relationships" whereby libraries greatly depended on the donors, particularly in information technology selection, acquisitions and even use of the technology in their libraries. Lishan (1993:15) has lamented this situation that extreme dependence on external technological sources in the area of information technology

was contributing to the weak status of its use by the African academic and research community. As a result, there has been over-dependence on imported information technology equipment and accessories, often at high cost. Consequently, such dependence has tended to limit the type and scope of the equipment, as the technology is frequently controlled by donors who in many cases enforce their own approaches and ideas. These approaches are often seen by recipient libraries to lack concern for the growth of institutional and national information service.

In spite of the number of developments and benefits that recipient institutions have seen, such as the acquisition of IT equipment and some training in skills and knowledge in the use of the technology, it could also be argued that donor assistance has partly betrayed its intended purpose. Durrani (1987: 110) for example, has decried the relationship between (information) technology and third-world exploitation by stating that:

Third world libraries often become tools in the hands of 'advanced technologies'...When few voices are raised questioning the relevance of all these technologies in the present conditions of the third world, new tactics are employed. 'Appropriate technologies' are brought in to reap yet another harvest of super profits for the 'Appropriate Technology industry' ( Durrani, 1987:110).

He thus cautioned third-world librarians that, since the information field itself has been invaded by the super-power and appropriate technologies have become a commodity to be bought and sold on the market, it was no longer possible for these librarians to remain neutral and uncommitted in the face of this invasion of technology.

It is also observed that there exists some contradiction between what sustainability of information technology means and what the donors are dictating to the recipient libraries. Information technology should be used as a tool in order to meet the "identified information needs" of the library clients, that is the "end products" implied by Brinkerhoff and Goldsmith in their definition of "sustainability" (1994: 369). If donors thus dictate or have more say on how and for what the donated information technology should be used than the recipient libraries who may know their own information needs better than the former, the important



question to be asked is: how then can recipient libraries effectively decide on the most viable ways of using the technology or working out ways based upon their own resources for its long-term sustainability? Lack of complete control of the technology by recipient libraries over its use in view of the greater influence of donors, could result in a negative impact on the overall provision of relevant information services to clients and the technology's future sustainability could be jeopardized.

A review of the literature has revealed that no systematic research or study has been done on the problem of information technology sustainability in the academic and research libraries under study. For this reason and in addition to the recognized importance of information technology to information services in general, this study on Tanzania is therefore relevant and justified. The study is or could also be important to other African countries receiving such donor assistance or support in that besides highlighting the problem of IT sustainability, it could also provide some feasible and potential propositions upon which a discussion of effective strategies for effecting IT sustainability in particular and that of the library system in general could be initiated and based.

### **1.3 Statement of the problem**

The critical issue to be investigated in this study relates to the strategies which Tanzania's academic and research libraries could adopt to facilitate the sustainability of information technology which has been (or is being) largely acquired from external donor assistance. It is assumed that dependable and long-term solutions capable of effecting the sustainable use of information technology and information services in general, have to be found locally and from the institutions' own resources. Related to this problem, Mushi and Kjeshus (1982:31) have correctly observed that aid (or donations) could assist development to the recipient if it laid the foundation for the recipient later to outgrow it; that is, if such aid or donation could be used in a way that promised or encouraged a self-reliant and self-sustaining situation in the future. It is in basing upon such a premise whereby donor support does not entrench the vicious cycle of donor dependence by the libraries, that this study becomes very critical and important to the libraries under study.

Although in Tanzania some steps have been taken to guide, advise and where possible regulate the use of imported technology in general, such initiatives have not been successful with regard to information technology. These steps have included the formulation of a nationwide Science and Technology policy, and the creation of the Tanzania Commission for Science and Technology (COSTECH) in 1985 and 1986 respectively (Parliamentary Act No.7). According to the 1986 Tanzania Commission for Science and Technology Act, the Commission (COSTECH) is the (Tanzania) government's current executing agency for Science and Technology. It is responsible for implementing the national science and technology policy. It therefore has the duty and mandate to advise and assist the nation at large; to ensure that the technology entering Tanzania will be fully assimilatable, adaptable and if possible locally sustainable for the country's development. However, these roles have not been fully realized by the commission with regard to information technology. Several factors could be advanced to explain this state of affairs. Firstly, the existing 1986 Science and Technology policy is dated, too general and therefore inadequately placed to satisfy the current needs of modern information technology. Surprisingly enough, information technology is not even mentioned or reflected anywhere in the policy document itself. Secondly, there is resource environment in which the Tanzania Commission for Science and Technology and its predecessor, the Tanzania National Scientific Research Council (TNSRC) have been operating. The fact that the commission is partly but largely donor-dependent for a sizeable part of its budget, limits the extent to which it can satisfactorily play all the roles entrusted to it, covering the vast spectrum of science and technology entering Tanzania. It is therefore no wonder that due to the current wave of privatization and the liberalization of the economy in the country, the importation of information technology by individuals as well as institutions is not based upon the commission's advice or approval. In other words, it could be argued that there are currently no guiding or regulatory measures in force affecting the importation of information technology. As a result, there has been a proliferation of different IT models of varying performance capabilities affected by the lack of harmonization of different IT hardware and software standards.

The advantages associated with the open market are efficiency, growth and minimally restricted free trade. However, in a developing country with limited resources like Tanzania,

there is a crucial need for guidance and advice on the kind of technology which is imported. This is vital in order to ensure that the few resources that are available are rationally spent and the acquired technology can be locally sustained and supported from own resources in the long-run. With these views in mind therefore, the investigation in this study took into account how the sustainability of information technology was being affected by donor funding, donor policies and whether information technology sustainability was a factor considered when making or receiving donations or grants. Policies of recipient libraries where they existed, were also analysed to find out how such policies affected the future sustainability of their information technology.

## **1.4 Purpose and objectives of the study**

The overall purpose of this study was to explore and investigate strategies which academic and research libraries in Tanzania can apply and / or put in place to facilitate the sustainability of information technology currently in use and that which will be acquired in the future, as a tool in the sustained provision of information services and products to their clientele. The study was based on the assumption that if information technology is effectively utilized it can positively contribute to not only effective library and information services, but also to general national development. As observed earlier, information technology currently in use among most of the libraries has been predominantly donor-dependent, making its future sustainability highly uncertain in view of possible donor withdrawal at the termination of supported projects.

Based upon the above-mentioned purpose, the specific objectives of the study were:

- i To assess the existing status of information technology in the libraries under study,
- ii To investigate methods in which information technology were being acquired by the recipient libraries,

- iii To investigate and evaluate the ways in which information technology was being used and find out whether its use is determined by the donor and / or recipient libraries' needs and / or policies,
- iv To find out what efforts recipient libraries were making to effect the sustainability of information technology currently in use,
- v Finally, to propose strategies which could lead to effective sustainability of information technology in academic and research libraries in Tanzania.

## **1.5 Research questions**

In relation to the above-mentioned objectives, the following research questions guided the conduct of this study:

- i What is the current status of information technology in libraries under study with regard to:
  - a) information technology available?
  - b) personnel?
  - c) information services being offered?
- ii How was information technology acquired; who financed seed-money for information technology and its future sustainability?
- iii What and whose policies determine the use of available information technology?
- iv What are the bottlenecks in the use and sustainability of the technology, how are these problems being and / or anticipated to be solved?
- v What strategies were in place and / or could be put in place in effecting the sustainability of information technology for its long-term use?

## 1.6 Definition of key terms

For the purpose of this study, the following key terms used, were defined as follows:

i **Academic libraries:**

These refer to libraries of universities, colleges and other tertiary institutions forming a part of, or associated with educational institutions.

ii **Research libraries:**

Libraries consisting of specialized document sources and providing facilities for undertaking systematic investigation. These might also offer referral services in support of studies in subject fields connected with development, testing and evaluation as well as conducting research (Prytherch, 1995: 549).

iii **IT Use:**

Refers to the application of information technology, for example computers and their related accessories to facilitate information processing, retrieval, dissemination and execution of routine library (house-keeping) operations. Included also, are the library management functions supporting library managements by the provision of timely information, and assistance with analysis and decision-making on the efficient use of resources and dispensing of effective information services and products.

iv **Information technology (IT):**

This study adopts the definition given by the Pan-African Development Information Systems (PADIS) (1994:1) as a field of investigation that takes as its subject-matter a variety of ways in which information flows, and the manner in which information is processed, utilized and communicated. It also comprises the machinery and equipment, as well as manuals, procedures, programs and software for producing and disseminating data electronically. Each of these technologies and their inherent operational procedures and programs serves the production, acquisition, storage, retrieval and dissemination of information.

v      **Sustainability:**

According to the **Oxford English dictionary** (1989: 326) the term means the ability to keep; maintain and improve, continue in a state, maintain something at the proper level or standard. In other words, it refers to the ability of an organization to produce outputs of sufficient value so that it acquires enough inputs to continue production at a steady or growing rate in the future. Such ability underlies the dynamic character of an organization or institution as an ongoing input-output process (Brinkerhoff and Goldsmith, 1994: 369).

The above definition of “sustainability” is general in nature and, therefore applicable to any field of study. For a specific definition capable of application to information technology in information systems for example, in a library environment, “sustainability” of information technology should refer to the ways, means or strategies an information system or organization employs or applies to acquire, maintain and continue to use the technology it has as long as is necessary for providing more and improved services and products to its users.

## **1.7      Scope and limitations of the study**

The study was confined to Tanzanian university, college and other tertiary institutional libraries, and to research libraries in research institutes which already use information technology in dispensing information / library services. Included also in this study were organizations which provide information as part of their overall functions, for example the Tanzania Commission for Science and Technology (COSTECH) and the National Environmental Management Council (NEMC). Such organizations have libraries or documentation centres as part of their information provision services. The investigation therefore involved libraries of local university, college other tertiary institutions and major research institutes and organizations which provide information or documentation services as part and parcel of their functions and services. Several criteria were applied in order to identify these libraries. Firstly, they had to be academic and / or research libraries as defined by the study. Secondly, they had to belong or be affiliated to local Tanzanian institutions or organizations which in turn determined their funding or financing. Thirdly, they had to use

information technology in their information processing and handling as well as in their provision of information services.

Based on these characteristics libraries belonging to primary and secondary schools were excluded from the study. Excluded also were libraries and information centres belonging to foreign embassies; missions and organizations. These are not locally owned and have different sources of funding and in all cases can manage to effect their own information technology sustainability. A preliminary survey was thus conducted to identify among the mentioned institutions those information centres and libraries which used the technology. Directories of libraries and research institutes produced by the Tanzania Commission for Science and Technology, the Tanzania Library Services and the National Environmental Management Council (NEMC) were consulted for the purpose. A list of 18 academic and research libraries was therefore identified as the population which guided the investigation as indicated in section 3.3. One limitation anticipated was on the availability of the required data and information on information technology available in these libraries. Experience has indicated that poor record-keeping in some of the institutions and libraries in particular was a problem. However, since the acquisition of information technology in Tanzania has generally been a recent phenomenon, the intended data and information was adequately available in most of the libraries studied.

## **1.8 Significance of the study**

The significance of this study was that it anticipated to up-date the status of information technology as well as its application particularly in academic and research libraries in Tanzania. This was important as it revealed the nature and extent of information technology available, level of its use and the information services being offered, problems being faced and the ways those problems were being, or would be, dealt with. Secondly, the study intended to come up with strategies and approaches which could help recipient libraries to sustain their information technology themselves, instead of continually depending upon donors. Experience has shown that one of the difficulties of heavy reliance on donor assistance is that if it continues for too long, it leads to the recipient's relaxing efforts to

mobilize local resources and develop its own means. In other words, continued donor dependence tends to stifle local initiatives to solve problems. The result in the case of libraries has been their inability to develop through own efforts and resources. This could also have implications for other information units in developing countries anticipating the use of or already using information technology in their information services. Thirdly, the study would also help to inform the donor community of what their recipients of information technology expect them to know when they make donations or grant assistance. This could bring some positive changes in donor policies, so that recipients' actual needs in respect of technology take precedence and priority. Donors, should for example, allow recipients to articulate or voice their needs in terms of the needed technology and also be given a chance of participation in the entire process of project identification; planning and implementation. The participation of recipients in such processes is crucial if their own capability of managing and sustaining such projects in the future is to be developed.

Lack of relevant literature and mechanisms through which librarians and library managements, especially in Africa, can share experience and strategies which other libraries are applying to solve various problems, has been cited as being responsible for the isolation many librarians are currently facing. The same factor has also been denying them the possibility of keeping abreast of new trends and developments in library and information management (Rosenberg, 1996: 254). This kind of study could therefore be the first step towards generating the literature which is vital to improve professional communication and the sharing of experiences on the issues investigated in this study. The current problem has been spoken about but not systematically addressed in the past. Finally, it was previously made clear that the sustainability of information technology is one of the most important areas where relevant literature is still scanty. This is because the introduction of the technology, particularly in developing countries' libraries, is in its infant stages, implying also that not much research has yet been done. Since it is an important and recognized area, this exploratory study could therefore kindle an interest among information professionals to study the issue further. Such studies would help to provide some experience-based practical solutions to the problem.



## 1.9 Summary

This section has identified and defined the problem namely, to investigate strategies which Tanzania's academic and research libraries can apply to ensure and / or facilitate the sustainability of information technology currently in use or to be acquired largely through donor support or assistance. The justification for such a study arises from the fact that temporary and limited donor support to libraries (for example the introduction of information technology), has in many cases failed to lead to sustainable or long-lasting provision or flow of the intended information services once external donor support ceases. According to Rosenberg (1994: 247), there has been some efforts to discuss the problem in the context of general library development in Africa, although she admits that no systematic study or research that has been done specifically on the sustainability of information technology.

The need for IT sustainability among these libraries is therefore critical if they are to continue meeting the demands of their users for IT-related information services. If effectively achieved by libraries the sustainability of information technology is likely to reduce or stop completely donor dependence and the current vulnerability of these libraries to donor assistance. It has also been argued that continued dependence upon donors for aid or support entrenches further dependence which in turn stifles local initiatives and development through own effort. The achievement of IT sustainability by the libraries is therefore likely to infuse a spirit of self-confidence among librarians in exploring locally-based innovative approaches or strategies for the development of the technology in their libraries.

Although donor assistance has acted as a seed bed for the introduction of information technology in these libraries, future use and development will depend upon whether the libraries themselves have strategies to guarantee its future sustainability. As seen earlier, donor support is always time bound and limited, implying that it is the libraries themselves which have to explore alternative IT sustainability strategies in the absence of donor support. Currently, very little is known and documented on what could be done to alleviate the problem. It has therefore been the object of this study to try at least partially to meet that need

by investigating potential strategies for libraries to reduce donor dependence and move towards information technology sustainability based upon their own resources. The purpose of this chapter has therefore been to provide a detailed account of what the study would cover, and how it would approach the problem.

## 1.10           References

- Abbot, M.A. 1987. **Towards an understanding of the meaning of the word “Use” in the phrase “Use of literature”**. MA (Unpubl.) Department of Library Science, University of Natal. Pietermaritzburg.
- African Regional Centre for Technology, (ARCT). 1993. **Carnegie Science and Technology Information STI support for sustainable development in Sub-Saharan Africa STI projects**. (Report of Carnegie-funded Sub-Saharan Africa STI projects). Dakar: African Regional Centre for Technology.
- Akhtar, S. and K. Melesse. 1994. Africa, information and development: IDRC’s experience. *Journal of information science*, vol.20 (5): 314-322.
- Brinkerhoff, D .W. and A. A. Goldsmith. 1992. Promoting the sustainability of development institutions : a framework for strategy. *World development*, vol.20 (3): 369-384.
- Camara, A. B. 1988. Implementing the information strategy for Africa: the first stages. *Information development*, vol.6 (1): 55-61.
- Chisenga, J. 1995. The status of information technology in Zambia. *African journal of library; archive and information science*, vol.5 (1): 19-24.
- Cole, S. 1986. The global impact of information technology. *World development*, vol.14 (10 / 11): 1277-1292.
- Durrani, S. 1987. Agricultural information services in Kenya and the third world. *Journal of librarianship*, vol.19 (2): 108-119.
- Hall, B. W. 1994. Information technology and global learning for sustainable development: problems and prospects. *Alternatives*, vol.19: 99-132.
- Jinabhai, C. C. 1995. Contribution of external aid agencies to the social sector: lessons for South Africa. *Development southern Africa*, vol.12 (1): 97-112.

- Levey, L. 1991. **Computer and CD-ROM capability in Sub-Saharan African university and research libraries.** Washington, DC : American Association for the Advancement of Science.
- Levey, L. 1992. **CD-ROM for African research needs: some basic guidelines.** Second Seminar of African Decision-makers, Oct.1992, & Jan. 1993, Harare. Washington, DC: American Association for the Advancement of Science.
- Levey, L. 1993. **A Profile of research libraries in sub-Saharan Africa.** Washington, DC: American Association for the Advancement of Science.
- Lishan, A. 1993. Sustaining academic networks in Africa : a system operator's perspective. **Electronic networking for West African Universities.** Report of a workshop. Accra, (Ghana): American Association for the Advancement of Science. pp.13-26.
- Mushi, S. S. and H. Kjeshus (*eds.*). 1982. **Aid and development: some Tanzanian experience** Oslo: Norwegian Institute of International Affairs.
- Mgaya, K. 1994. Development of information technology in Tanzania. E.P. Drew and G .F. Foster (*eds.*) **Information technology in selected developing countries.** Tokyo: United Nations University.
- Mlambo, A. S. 1993. "The rich shall inherit the earth": towards the role of IMF Structural Adjustment Programmes in Sub-Saharan Africa. *Zambezia, journal of the University of Zimbabwe*, vol.20, (1): 53-76.
- Pan-African Development and Information Systems, (PADIS). 1994. Concepts and working definitions. **Training Workshop for University lecturers teaching library and information science in African universities and institutions of higher learning.** Gaborone, Botswana, 5-12, December.
- Priestley, C. 1993. **Evaluation of SAREC library support programme: Ethiopia; Mozambique and Tanzania, 1985-1993.** Stockholm: Swedish Agency for Research Cooperation with Developing countries.
- Prytherich, R. 1995. **Harrod's librarians' glossary.** (8th ed.). Aldershot : Gower.
- Rosenberg, D. 1994. Can libraries in Africa ever sustainable? *Information development*, vol.10 (4) :274-251.

Rosenberg, D. 1996. **University libraries in Africa: a review of their current state and their future potential.**(vol. 1 summary). London: International African Institute.

Schware, R. and Z. Choudhury. 1988. Aid agencies and information technology development. *Information technology for development*, vol.3 (2): 145-158.

Simpson, J. A. and E .S .C. Weiner 1989. **The Oxford English dictionary.** (2nd ed.). Oxford: Clarendon Press.

Tanzania, Ministry of Planning and Economic Affairs. 1985. **Science and Technology policy for Tanzania.** Dar-es-Salaam: Ministry of Planning & Economic Affairs.

Tanzania,. 1986. **The Tanzania Commission for Science and Technology Parliamentary Act No.7 of 1986.** Dar-es-Salaam: Government Printer.19 pp.

Zulu, S. F. C. 1994. Africa's survival plan for meeting the challenge of information technology in the 1990s and beyond. *Libri*, vol.44 (1): 77-94.

# CHAPTER 2

## REVIEW OF RELATED LITERATURE

### 2.1 Introduction

The review of literature examines issues raised by related studies on the concept of sustainability. It looks specifically at the origin of the concept and the possibility of its application to donor-funded information technology by academic and research libraries in Tanzania. Amongst other things, issues that are raised include the identification of factors or reasons for donor insistence on sustainability of externally acquired information technology and the benefits expected from sustainability by recipient libraries. It also identifies problems that could affect sustainability as well as proposals that could facilitate its achievement. Finally, the findings in terms of problems and proposed strategies for sustainability as revealed by several studies, have been generalized and partly formed the basis of some key issues for investigation in this study. Experience from other fields of study where similar donor involvement has been present for quite some time, and studies on sustainability of those projects done, has also been exploited and related to the information field.

### 2.2 Sustainability : its historical origins

According to available sources the concept of “sustainable development” or “sustainability” could be attributed to Hotelling (1931), who in his work: **The Economics of exhaustible resources**, addressed the problem of the astonishing rate of environmental and natural resources depletion, and discussed possible solutions to alleviate the situation. Since then, the concept of “sustainable development” began to emerge as a strategy to improve global environmental security. The concept became also an attempt to try to bring together economic development and environmental and natural resources protection into a single science. Lindner (1987: 3) observed that it was the International Union for the Conservation of Nature

and Natural Resources (IUCN) which later in the 1980s further developed the concept as a strategy in its publication entitled: **World Conservation Strategy**. The Brundtland Commission (The World Commission on Environment and Development), adopted and popularized the concept, and gave it relevancy and urgency in relation to bridging the gap between a deteriorating environment and the imperative to provide basic needs for an increasing human population. The Commission defined “sustainable development” or “sustainability” in relation to these two overriding concerns as:

paths of progress which meet the needs and aspirations of the present generation without compromising the ability of future generations to meet their own needs (WCED: 1987: 32).

Currently, “sustainable development” which originally addressed issues related to the environment and natural resources, has now permeated almost every field of study, including agriculture, industry and industrialization, rural development, water sanitation, and other fields. As a result, the concept is no longer a domain for only one field and is therefore acquiring a variety of meanings and definitions in response to the different fields and context in which it is being used. In other words, “sustainability” is viewed and defined differently depending upon the field or area of study, and the context of its application. Basically, its underlying meaning remains the same in various applications, the difference being in aspects which different fields of study emphasize in its applications. For example, in environmental and global security, the emphasis is on the regeneration and sustainability of natural resources. In the information field, the emphasis is placed on the processes of information selection, acquisition, storage, analysis, synthesis, consolidation, dissemination and transfer, such that the range of activities, products and services that are derived or developed benefit the targeted users. The emphasis here is not so much on the sustainability of information itself, but on the (information) system in which it is applied and its related technologies.

Although the concept of sustainability, especially of information systems and related services, has been a concern of information professionals, it has however not been systematically addressed. In the information field, the concept seems to have been used in the first instance in a research report commissioned by the International Development Research Centre

(IDRC), Canada (Agha, 1992): **Sustainability of information systems in Developing countries: an appraisal and future courses of action**. The report was based on a survey and employed several data gathering techniques, including the questionnaire, interviews, delphi survey, visits, and the analysis and review of project documents as well as literature on sustainability. These research instruments proved quite effective as they facilitated the collection of adequate data and information from which the study could identify problems affecting the sustainability of information systems and propositions towards effecting their sustainability. The report was mainly concerned with information systems in developing countries of Africa, the Caribbean and North America. In this study, the concept of sustainability was examined, conceived in the light of strategies which could be employed by information systems in developing countries to achieve their sustainability, and how sustainability features could be built into donor-funded information projects carried out in developing countries.

Agha (1992) argues that there is a strong relationship between sustaining the information system in general and the technology which helps it to work. In other words, it can be argued further that the sustainability of information technologies in libraries and other information systems needed to be conceived within that of the information system as a whole. This is so because information technology cannot be divorced or separated from the system and the information it is supposed to handle. Therefore, the sustainability of information technology in libraries is very much dependent upon the overall sustainability of the library or information system in general. It is within this sense that information technology becomes an enabling technology which functions to enhance the capability of the library or information system so that it can satisfy user information needs. Given the symbiotic relationship, the sustainability of information technology in an information system can thus be defined as: the maintenance and continuity of an information system and its related technologies as long as is necessary, enabling the information system to perform its functions effectively and in accordance with its mandate and objectives so that those functions satisfy the information needs of its user community. Closely related to the above definition, Agha's (1992) findings thus proposed several strategies which could facilitate the sustainability of information



systems. These involved-:

- the development of indigenous personnel training capacity;
- formulating a planning marketing approach as a continuous operational process;
- the need to influence government policy towards support for information systems;
- the need to convince management of the value and benefits of information;
- the necessity of generating income out of information services and products; and
- the parallel development of appropriate information policies and infrastructure.

In the realm of the present study, these findings identify extremely important key issues in relation to facilitating sustainability namely, the importance of human resources development; the marketing of information services and products which respond to identified user needs; enhancing the role and value of information; sensitizing management for effective support to information; the importance of resource-generation in libraries; and more importantly, the need for information and or information technology policies and the development of information infrastructure, that can be raised in respect to the sustainability of information technology in academic and research libraries under study. The same findings could also imply related problems affecting sustainability. As such, they constitute both problems as well as strategies towards the achievement of sustainability. In addition to the findings and research methodology employed by Agha's study, another equally important contribution to this study is how the concept of sustainability should be conceived and applied in relation to information services and in particular information technology.

## 2.3 Donor agencies and sustainability

Donor insistence on Tanzania's academic and research libraries assuming responsibility for sustaining externally acquired information technologies has been a recent phenomenon. This requirement by the donors upon recipient libraries came in when the introduction of the technology in most of the libraries was still in the very early stages of development. As such, recipient libraries were therefore, still more concerned with the acquisition and development of information technology than how the technology could be locally sustained. Several factors could explain the late start in the acquisition and use of information technology among most of the academic and research libraries in Tanzania. Among others these factors have included the government's Parliamentary Decree of 1974 which prohibited the importation of data processing technologies into the country. Secondly, the poor economic base of the country, and the economic crisis resulting from the IMF Structural Adjustment Programmes (SAPs) from the early 1980s.

The introduction of information technologies in the late 1980s, especially in government departments, by external donors to assist the government in collecting relevant statistical data (Mchombu and Miti, 1992; Mgaya, 1994), and the need to strengthen the teaching and research capacities of some higher learning and research institutes in the country, implicitly required that the recipients of those technologies contributed locally at least to its partial maintenance. Over time, the idea of local contribution to donor-funded projects began gaining ground so that by the early 1990s "sustainability" became entrenched as one of the characteristic features of every donor-funded project. Although local sustainability as required by the donors was not an explicitly declared donor policy, nor was there any identified percentage to be contributed by recipients of the technologies, one could however infer it from various donor project documents relating to the supported information projects. In fact aid agencies like IDRC for example, acknowledge that they began using the concept as early as the 1990s as a basis for their future aid programmes (Agha, 1992: 2; Agha and Akhtar, 1992: 284). The International Development Research Centre, (IDRC- Canada) representing other donor agencies indicated a change in its donor policy in favour of local sustainability of assisted information projects in Africa as early as the 1990s. Agha and

Akhtar, (1992: 284) for example, have noted that:

Several international organizations and development agencies, international non-governmental organizations (NGOs) and others... have shifted focus towards projects that enhance capacity building and promoted sustainable development. IDRC (and others) is now putting even greater emphasis on projects that have mechanisms to assure financial as well as project sustainability. To assure this it promotes projects that aim... to develop business plans and marketing strategies in order to generate revenue from information products and services they have to offer (Agha and Akhtar, 1992: 284).

donor The requirement for sustainability in the case of African university and research libraries, is also echoed for example, by the Swedish Agency for Research and Cooperation with Developing countries (SAREC) and the Carnegie Corporation of New York (Priestley, 1993: 25; Levey, 1993: 14). Both these donor agencies are currently assisting a large number of information technology projects in a large part of Sub-Saharan Africa particularly in academic and research information establishments. In the SAREC's **Library support programme, 1985 - 1993 evaluation report** of on-going library projects in Ethiopia; Mozambique and Tanzania, for example, Priestley (1993: 25) pinpoints the fact that:

SAREC took the initiative to strengthen the research infrastructure of some universities... by establishing a programme for support to university (and research) libraries. However, no support can or should last forever and it is important for any library to plan for eventual independence of donor funding ( Priestley, 1993:25).

As indicated above, the change in donor attitude and therefore implicit donor policy in favour of local sustainability of donor-supported projects including information technology, could be explained by several factors.

The first of these is the form, nature and duration of support given which is often a “one-off investment” on the part of the donors. This type of project aid does not guarantee its own future sustainability because it is ad hoc, limited in duration, and has no in-built sustainability mechanisms. In order therefore for donors to avoid blame resulting from the failure of these projects in the future, emphasis on sustainability for donor-supported projects has become important. Relating to a similar factor, Bossert (1990: 1015) and Stefanini (1995: 42) have

observed that the donor insistence on local sustainability of supported projects has been of interest to the donor community because it is obviously concerned about the continuation of its projects. Citing reasons why donors have initiated and insisted on sustainability of their projects, Bossert (1990: 1015) argues that donors need to know what happens to donor-supported projects when funding stops.

...the central objective of this new interest is to learn how to design projects so that the activities and benefits that are achieved during the life of the project will continue after their funding has ceased, and other sources of funding must be found to maintain them (Bossert, 1990: 1015).

Bossert (1990) and Watson (1993) however, do not totally accept the arguments advanced above on the donor insistence on sustainability. Both scholars question the rationale of sustainability as being rather ironical since the issue was being raised at a time when the proportion of total international bilateral and multilateral foreign assistance has been rising steadily as new donors were making greater contributions. Both scholars consider this current interest in enforcing the issue of sustainability upon recipients of aid as a fad that will shape donor policies for the years to come.

The second factor of enforcing sustainability of donor-assisted projects relates to the lucrative nature of projects as a form of aid especially in developing countries. According to Sisaye (1982: 152); Morss (1984: 467) and Business International (1990: 23) project aid is identified as one of the main sources of lucrative business opportunities for both donors and multi-national companies. The aid or donation that is given is channelled to definite and recognizable projects which require consultancy, supplies and works contracts for completion. Several reasons why project aid or donation is more lucrative and therefore favoured by donors than any other form of aid include that:

- projects by their nature have a limited life span and, are more easily controlled by the donors than non-project aid;
- it allows donors to direct investments into areas that recipients may neglect, and where donors have capability and interest;

- it allows “tying” aid or donation to a host country’s goods;
- it generates a shopping list of goods and services within a given period and is therefore attractive for business;
- it largely prevents the recipient from switching spending to other than the uses intended;
- its results are relatively easy to monitor;
- it provides a donor with a “showcase” that may enhance its prestige in a recipient country.

What all these factors imply is that donors’ control and decision-making over their aid inputs, and self-interest are enhanced to the extent that a project can sometimes become a show-piece with little related to the real needs of the recipients. It is from the lucrative nature of such form of aid that the issue of local sustainability of once-supported projects is enforced upon the recipients by the donors. The continuation of such projects even if they are not satisfying the needs of recipient libraries, guarantees future acquisitions and supplies in terms of spare-parts, consumables and the like, which are part of multinational company business. Moore and Newbigging (1983: 33) for example, analysed the philosophy behind most aid including IT and came to the conclusion that:

It would be naive to think that aid in whatever form is given purely out of a disinterested and humanitarian on the part of the donor. Aid is a means of buying influence, leverage and support, and it is based on self-interest which involves political, diplomatic, military, economic and commercial considerations. To put it simply, aid is always an element of foreign policy (Moore and Newbigging, 1983: 33).

Referring specifically to information technology projects in Africa, Kluzer (1990: 182); and Robredo, *et al.* (1991: 85) also concur with the above conclusion. Both have noted that albeit officially non-profit motivated, bilateral aid was in fact a well known channel for market penetration by commercial companies. For example, many of the computerization projects especially in developing countries, were started because computers were donated by

companies eager to gain a foothold in strategic sectors. New entrants, like microcomputer firms, also saw the development [donor] agencies working in developing countries as the initial market, providing a testing ground and a vehicle for long-term product recognition. The third factor is that donors themselves are becoming more aware that some of their projects become incapable of sustaining the initial achievements gained because of two important factors. Firstly, donors themselves do not bother to include future sustainability mechanisms in such projects; and secondly, recipients lack the resource capacity to sustain those achievements with the end of such projects. This realization has emanated largely from the frequency with which projects have failed following donor withdrawal. Coombs' observation perhaps summarizes this state of affairs. He states that: "The landscape of Third world is today littered with carcasses of pilot projects that have failed to pilot anybody anywhere" (1985: 308). This situation has normally been caused by the fact that recipients' capability and resource capacities are not evaluated prior to the formulation and implementation of such donor-supported information projects. Furthermore, donors themselves take it for granted that given the benefits accruing from these projects, recipients would be able to see their importance and therefore sustain them. Examples of such projects are not very difficult to find in developing countries. In Tanzania for example, the **Tanzania Library Information Service project (TANLIS)** of the mid-1980s could be a case in point. The project received funding, personnel training and information technology from Sweden in order to assist in the dissemination of current information services (Current Awareness Service-CAS), to academia, development planners, agriculturalists, industrialists, doctors and other practitioners. The project failed to achieve its intended objectives because donors did not assess the future potential capability of recipient libraries to raise adequate resources to sustain its achievements after the end of donor assistance. Furthermore, donors themselves did not include sustainability mechanisms during the implementation of the project to ensure that its future sustainability would be guaranteed. Since donors appear to be afraid of making similar mistakes of creating "white elephants" that cannot be maintained after they have left, they now insist on project sustainability.

Another reason for the rise in donor insistence on sustainability of projects, relates to the overall environment of diminishing aid funds and resources on the part of the donors.

Combined with this, is the need for the same donors to shift their support to projects in new fields of more interest, which in turn could also attract more funding from governments and organizations. Bossert (1990: 1015), Priestley (1993: 12) and Bean (1994: 84) concur with this argument that donors the world over have tended to follow particular fields or sectors of their interest in international assistance or support. For instance, in the 1960s the major emphasis of donor support was on the eradication of malaria, in the 1980s the focus had changed to child survival, and currently (1990s) is on multi-party democracy, and the sustainable development of the environment and improved natural resources management projects.

A shift in donor interest or priorities to begin supporting new areas or sectors other than those once supported could also explain the current interest of donors in enforcing sustainability on earlier assisted projects. This sub-section has dealt with the factors that could help to explain why there has been much insistence by the donors upon recipient libraries to undertake the sustainability of information projects previously and currently supported by donors. These factors are important because they help to shed some light on why donors are currently making the sustainability of projects one of the conditions of their aid or support.

## **2.4 Relevance of sustainability to recipient libraries**

According to Rosenberg (1994: 247) the issue of sustaining information services among most of the recipient libraries was not new or unknown. This being the case however, most libraries particularly in developing countries like Tanzania, have not yet established a formal system of activities or strategies through which the sustainability of information services and information technology, could be effectively planned and implemented. Several mechanisms or strategies that have been attempted for example, towards resource-generation or resource-sharing and co-operation in order to improve library and information services, have met with little or no success. Several problems which have affected the success of these efforts towards library sustainability have been mainly the lack of information policies at institutional or library level, and the absence of strategic development plans in most of the libraries. Rosenberg (1996: 361) has emphasized that information policies and library plans are

essential for library sustainability in that they could have provided libraries with suitable frameworks within which these attempts could have been implemented. It could be argued further that among others, these two factors have denied libraries an appropriate framework based on information policies and development plans, through which a systematic library / information sustainability strategy could be conceived and hence implemented.

This sub-section, therefore, emphasizes the overall importance and likely implications of effecting the sustainability of library resources and services particularly, externally acquired information technology. On the part of aid recipients, the requirement by donors to sustain the acquired information technology projects, and hence its acceptance, can be seen as an important and appropriate reflection of according complete and adequate attention, and priority to the development of the technology in these libraries. From the view of aid recipients therefore this could imply several advantages.

Firstly, recipients could assume more control in choice, use and planning of information technology especially in relation to satisfying user needs. As Ballantyne (1994: 27) puts it, information technologies, like information in general, need to be evaluated against their usefulness to established local requirements or needs and priorities; otherwise technologies and not user needs would drive information services. Secondly, the possibility of using the technology to provide a variety of information technology-based services and products could be greater as the recipients would no longer be tied to donor needs and dictates, and therefore not limited in what the technology could be used for. Amadi (1981) while hostile to any development that infringes on African traditional values, agrees that information technology and media are acceptable so long as they are used to facilitate the transmission of appropriate information in appropriate ways to appropriate settings.

Thirdly, the understanding on the part of the recipient libraries that donor support was time-specific and could end at any moment, could revive and therefore facilitate the spirit of effective forward looking planning and management of library and information services, particularly information technology among the libraries. It could also facilitate the exploration of alternative and varied locally-based ways of improving the resource-base of



libraries which has in most cases, been partly responsible for the non-sustainability of the technology and the library system in general. Given that most of the libraries are currently dependent on donor funding, particularly in the acquisition of information technology, it is equally difficult for them to define the circumstances and conditions under which they can facilitate IT sustainability in the presence or influence of donors. The attainment of sustainability by the libraries is therefore likely to facilitate libraries' own decision-making processes on services and related resources like information technology.

## **2.5 Problems and / or strategies affecting sustainability**

This sub-section reviews studies on sustainability. It identifies and raises key issues which could be relevant to this study. In relation to the problem of sustainability of information technology in academic and research libraries these issues entail identifying problems which affect sustainability as well as their solutions. The two have been dealt with together on the assumption that firstly, if these problems can be effectively taken care of or solved, those solutions can in fact be strategies for effecting the sustainability of information technology in libraries. Secondly, much of the relevant literature on the issue of sustainability is more concerned with identifying sustainability strategies through which problems affecting sustainability are indirectly reflected. The review of other studies is therefore done to determine strategies (and problems) being proposed in these studies which could be relevant to or applicable to the sustainability of information technologies in libraries under study. The approach employed reviews all relevant studies and finally provides a generalized summary of both problems and related strategies.

Although very little literature exists on the problem of sustainability of information systems and specifically information technology in libraries, some relevant studies in other sectors on the issue of sustainability can highlight issues that could be beneficial to this study. As discussed earlier, the study report commissioned by the International Development Research Centre (IDRC) of Canada (1992) is the earliest donor agency's empirical research study to deal specifically with the issue of sustainability of information-related projects IDRC had

been funding in Africa, the Caribbean and Latin America. In order to gather pertinent data and information the study used several data gathering techniques including the questionnaire, delphi survey; visits, analysis of documentary reports of projects, and the review of literature relating to sustainability in general. All these techniques were effective in that the study managed to come up with strategies that could facilitate the sustainability of information systems in developing countries.

The overall and major finding of the study generally acknowledges that in spite of the situations in which information systems in developing countries are placed, there is the potential for them to evolve over a period of time to put into place strategies that could enable them achieve sustainability. According to the study, the sustainability of information systems in developing countries could be effected if the following strategies could be effectively addressed or implemented. Strategies earmarked for implementation by the government in order to facilitate the sustainability of information systems included:

- firstly, the need for government planners and decision-makers to recognize the value and usefulness of information.
- Secondly, the need for government to ensure that information is effectively managed and financially supported.

Recommended strategies for the information professionals within the information system to facilitate sustainability included:

- the need for professionals to implement the necessary strategies that related to the management and operation of an information system. These are:
- to ensure the optimum use of available resources to attain efficiency; the identification and knowledge of users, their needs, and ensuring the relevance of information services and products to user needs;
- adapting and maintaining high levels of professionalism and service in order to create an outlook of self-reliance, resourcefulness and other positive attitudes;

- the need to convince management of the value and benefits of information;
- the necessity of generating income from information services and products;
- the parallel development of appropriate national / institutional information policies and information infrastructure;
- the development of indigenous human resources through training; and finally,
- effecting a planned marketing approach as a continuous operational process of information services.

In the case of donors the study recommends the need for them to work closely with the recipient information systems. The assumption is that it is through mutual cooperation between donors and recipient libraries that the actual needs or requirements of the recipients can be effectively determined, and therefore donor assistance should be appropriately tuned to fulfill those needs. In addition, it is through recipients' participation in such projects that they can develop the managerial capacity for future management of such projects after the withdrawal of donors.

In addition to the proposed sustainability strategies, IDRC's study has implicitly raised several questions which may equally affect the sustainability of information technology in libraries under study. The poor recognition of the role and importance of information by planners and decision-makers in government is one of these problems which indirectly leads to inadequate provision of needed investment and financial support to information systems, hence their non-sustainability. Other problems implied by the proposed sustainability strategies include, for example, the absence of user needs assessment which is important in effective use of information technology; lack of adequately trained human resources in libraries; and lack of or inadequate management skills in the running of information systems. All the problems raised are relevant issues to the sustainability of information technology in libraries and could help this study in fine-tuning of the research instruments on key factors or strategies affecting it. Furthermore, the survey methodology the IDRC study has used has also been beneficial in that it has provided a range of data gathering techniques upon which

appropriate and suitable research methods for this study could be identified.

In addition to other strategies that the IDRC study has proposed, one of the most important issues relevant to the present study in effecting sustainability, is the need for effective planning of information systems and related services based upon a well formulated information policy. According to the IDRC study, an information policy within a nation or an institution like a library is the cornerstone of sustainability. An information policy provides vision and sense of direction for the nation, or for an institution like a library. Furthermore, it provides a base upon which effective planning of information systems and services can be facilitated. An information policy could also give guidelines for the systematic identification of user needs and priority areas which need to be developed. It could further assist in the rational allocation and use of resources based on those priorities. Since such a policy gives vision and direction necessary for effective planning of information services, it could also guide internal monitoring, reviewing and evaluation of the information services and the ways in which they are being implemented. Akhtar and Melesse (1994) support this view, and have argued in the case of African countries, that the absence of information policies in most of the African countries was seen to be the most serious problem from which other obstacles or problems affecting the development and eventual sustainability of the information sector emanated.

Similarly, IDRC (1989) advanced six arguments for the indispensability of an information policy as being crucial in preparing conditions for the sustainability of information systems. The same reasons could equally be relevant in preparing conditions for the sustainability of information technology in libraries, given that information technology is also part of an information system, for example in the library. IDRC emphasized that:

- i It has become the practice of governments to allocate resources on the basis of principles and directions laid down by policies. Policies are therefore tantamount to declarations by governments of their intent to take development action;
- ii There is a need to have policies which establish governance over information activities, in particular regulatory policies are required for coordination,

networking and resource sharing, information exchange importation of information products standardization, creation and maintenance of information centres, databases, data banks and statistical / numerical information systems,

- iii Policies improve the chances of locating accountability, defining institutional responsibilities and spearheading change.
- iv An information policy can energize and open up the information sector by laying guidelines for the application of information technologies, computers, telecommunications, including manufacturing of information networks.
- v There is need to control and coordinate donor support and this can be done only if government shows its willingness to create supportive conditions for the development of the information sector.
- vi Without policies, governments cannot hope to stimulate an integrated approach to information provision, or to motivate coordination among existing information agencies and effective creation and use of professional and technological capabilities.

In case of libraries the lack of information and IT policies has been identified as being responsible for the non-sustainability of these libraries. A study by Rosenberg (1996: 361) which examined the feasibility of university libraries in Africa sustaining themselves with minimal or without donor support, singled out the absence of information policies and therefore, lack of effective planning, as some of the major factors affecting the sustainability of these libraries. Rosenberg's study examined and evaluated the achievements of African university libraries in terms of their ability to sustain themselves. Her study intended to formulate plans on how libraries within the available resources, could move towards their own sustainability. The findings showed that without doubt, the legacy of [donor] interventions to assist university libraries in Africa towards sustainability was discouraging. Two of the major problems identified as contributing to the non-sustainability of African University libraries she studied were the continued lack of information policies at all levels, both on the part of funding agencies and the libraries and secondly, the lack of a suitable framework or context for donor support. These problems resulted from the fact that few libraries had policies upon which effective library development plans could be worked out

and implemented. Rosenberg's conclusion in relation to donor support to African libraries reflects the importance of an information policy at institutional (library) level in effecting library sustainability when she states that:

While many interventions have been attempted [by donors], few have had a long term impact and to date none appear to offer satisfactory solutions to meeting the information needs expressed by academics and researchers... *Two of the greatest problems continue to be lack of information policies, both on the part of the funding agencies and libraries, and the lack of a suitable framework or context that is, library development plans for support (Rosenberg, 1996 : 361). (Emphases are the researcher's own).*

It can further be argued that at a national level, the ability of the government to develop effective policies and plans depends upon the ability of planners and decision-makers in government to acquire and interpret information relevant to the country's socio-economic and cultural situations. Therefore, one can argue from the foregoing that a strong national information infrastructure allows for access to information from various sectors and provides the basis for sound planning and decision making. Such an infrastructure requires that sound information policies exist to provide the framework for the development of information systems and services to meet development needs. In essence therefore, the formulation of information policies should constitute a vital component of the overall national development policy which in turn could facilitate the sustainability of the information system within the nation. The same argument could equally be extended and applicable even to information systems like libraries in achieving their own sustainability including that of information technology.

Works by Mchombu and Miti (1992) and Zulu (1994) have also shed some light on the indispensability of a national or institutional information policy as a *sine qua non* to the development as well as sustainability of information systems in Africa. While these articles are based on philosophical discussions, Mchombu and Miti (1992: 141) for example, argue that an information policy improves the chances of obtaining resources by forcing the government to make an information sector one of its priorities and to recognize its importance in national development. What is being proposed here could also work at the level of an institution like a library as long as an institutional information policy is formulated.

From the above studies what could be gathered is the primacy of having an explicit information policy at national level. It is also important to have clear policies at lower levels such as the local and institutional levels. Furthermore the institutional management has to be committed to realizing its objectives, if information technology and the information system in general is to be sustained. Institutions like libraries under study could evolve institutional information and IT policies within their overall library / information operations to cater for the ways and manner in which information technology could be used and sustained. Such policies would provide a supporting environment through which strategies for mobilizing the needed resources and processes for achieving sustainability could be worked out. In the case of this study, it is thus noted that information and IT policies at any level at national or institutional levels, influence all aspects that would be necessary in creating conditions for the sustainability of an information system and its related technology. The six arguments advanced by IDRC (1989) reflect not only its importance but also its implications in terms of planning, management and allocation of resources to an information system and particularly information technology development and its future sustainability.

Two other important studies that have dealt with the issue of sustainability of donor-supported projects are those of Bossert (1990) and Stefanini (1995). Both are case study articles of donor supported health projects in Central America, Africa and Uganda respectively. Although these studies were undertaken in different countries with differing economic environments, the main issue dealt with is to examine the possibility and suggest strategies which could be instrumental in effecting the sustainability of donor-supported health projects. The propositions towards sustainability emanating from the two studies indicate that they can equally be applicable in library environments in relation to effecting the sustainability of information technology.

Stefanini's study in Uganda (1995) for example, recognizes three problems being responsible for the non-sustainability of donor-supported health projects. These included the inability of recipients to mobilize, absorb and use whatever internal and external resources were available that is, problems resulting from poor management and use of available resources. Secondly, is the absence of a viable implementation framework supported by the necessary managerial

and technical expertise. Thirdly, the inability to ensure the existence of the project's own financial support that is, lack or inadequacy of needed resources. The study recommends firstly, the creation of an institutional framework or plan, where roles and responsibilities are clearly defined for the implementation of policy in accordance with identified needs. Secondly, it identifies the need for effective management training aimed at imparting necessary managerial and technical expertise. This could only be done through a continuous and sustainable learning and training process. Thirdly, it emphasizes the need to have financial / resource sustainability for the project in question.

Similar proposals for sustainability are also identified by Bossert (1990) in his study of donor-supported health projects in Africa and Central America. His recommendations towards achieving sustainability reflect what other studies reviewed earlier have proposed. According to Bossert, for donor-funded projects (for example information technology projects in libraries) to be sustainable they should be designed and managed so that they:

- demonstrate effectiveness in reaching the clear goals and objectives;
- include a strong training component;
- integrate their activities fully into established administrative structures of the institution implementing the project;
- gain levels of funding from national and institutional sources; and finally,
- project design should be a mutually respectful process of give and take between donors and recipients.

Bossert (1990) argues further that problems affecting sustainability can thus be conceived from the weak financial or economic context, and the weak capacity of the institution implementing the project in terms of resources, managerial and technical expertise. These are important variables that can affect even the sustainability of information technology in libraries. As such, they provide this study with key issues and parameters upon which to base the investigation on the sustainability of information technology in libraries.



Assessment of donor-supported information technology to satisfy the user information needs has been identified as another problem which could affect its use and sustainability in libraries. A study by Newa (1993) for example, admits that information technology is a challenge to developing country library environments especially on its localization and adaptation. However, he also believes it can be sustained. Through his discussion of the issue of sustainability based on professional experience in the library environment, Newa proposes a number of practical measures towards IT sustainability. These include the need for proper assessment of the technology by the recipients, long-term planning and professional commitment to the adoption and sustainability of information technology. He argues that:

A correct assessment of information technology innovation should include an examination of its requirements as regards physical and social infrastructure, its possible effects on new environments, and finally, the nature of the limitations to information utilization which it is design to alleviate (Newa, 1993: 81).

Implied in the above is the whole issue of information technology sustainability. Two important issues which Newa raises and which are also important for this study are firstly, the need for both donors and particularly recipients of the technology, to assess the suitability and appropriateness of the donated technology in relation to the information needs as defined by the recipient libraries. Secondly, and related to assessing the technology, is the need for assessment of the social and physical library environments to determine whether they are adequately placed to facilitate the effective utilization of the technology. Such assessment is important because inappropriate social and physical library environments, could make the technology completely unsuitable even if it could have satisfied the needs of library users. The social and physical aspects of the library environment which need to be assessed include professional acceptance of, and commitment to, the technology; the level of resources the library has; IT support from users of the library; existence of adequate IT skills and expertise which are vital for the effective utilization of the technology; IT physical infrastructure in terms of dependable electricity supply; IT back-up and maintenance services. All these are important variables in creating an enabling social and physical library environment which could facilitate the effective utilization of the technology, and therefore its sustainability.

Farrel (1979) and Bender (1993) concur with Newa on the need for assessment of the technology as well as the suitability and appropriateness of the social and economic environments of the library in which the technology would be deployed. They argue that information technology could in the long run become unsuitable and non-sustainable if among other factors, its recipients have inadequate knowledge of what to look for when IT donations are made. In short, such very important information for the recipients to look for in the assessment of information technology has been summarized by Bender (1993: 123) as:

The need to have a real understanding as to what technology; advised by whom, and for what reasons is being used, where and by whom to do what? (Bender, 1993: 123).

According to Bender this important information has been missing on the part of the recipients, and it has been affecting the proper acquisition, use and therefore, the future sustainability of the technology especially in developing countries. In some instances, out of ignorance, recipients accepted donated technologies which later proved to be unsuitable to their needs and frustrating to their expectations. The importance of this information in relation to effecting IT sustainability is further confirmed by the experience from the University of Dar-es-Salaam library which had to seek technological advice and experience from the University of Zimbabwe before it could accept donor support in the form of CD-ROM work stations from the Carnegie Corporation of New York (Newa, 1993).

While the assessment of information technology by the recipients is important, Farrel (1979: 247) adds another dimension. According to Farrel emphasis on IT assessment is important but has to be more on the “*embodied technology*” or “*the real technology*”, which is embedded in human resources development. What is implied is that effective transfer, adoption, use, and future sustainability could be guaranteed among libraries only if a relevant IT human resources development strategy is effected. He therefore argues that:

...technology is knowledge (know-how) repositing in human beings and combined with understanding. Technology thus is not simply machinery or equipment. The highly visible physical artifacts of technology which we identify as being synonymous with technology, are in fact nothing more than just the embodiment of technology... *The whole question of any technology then must be conceptualized in terms of possession of dynamic knowledge, skills and capabilities embodied in human resources development* (Farrel, 1979:247). ( *Emphasis is the researcher's own*).

Other sustainability strategies which Newa (1993) has suggested towards IT sustainability include: the need for instituting cost recovery / cost-sharing mechanisms; effecting marketing of IT services and products in order to create a dependable user-base capable of moral and financial support to library services including information technology; and the inclusion of IT as a line-item in subsequent library annual budgets. Furthermore, he recommends effecting networking and the institution of twinning programmes with other institutions locally, regionally and internationally for sharing of resources. Newa also recommends the creation of local databases out of local, unpublished (grey) literature which could be marketed both locally and internationally as a source of income to libraries. Lishan (1993: 22) recommends a similar effort of creating local databases with the use of the available information technology, given the inadequacy and biased content and coverage found in international databases. Most of these databases rarely cover research and academic literature emanating from developing countries. Major issues which are relevant lessons to this study on the sustainability of information technology which Farrel (1979), Bender (1993) and Newa (1993) have raised above include:

- the importance of aid recipients (in this case academic and research libraries) to assess the appropriateness and suitability of the donated information technology in relation to responding to library user information needs. This is crucial if the technology is to be integrated, supported and sustained as part and parcel of the normal library / information services.
- the assessment of the social, economic as well as physical library environments (in terms of IT skills and knowledge and fiscal and physical resources) is also critical as these are facilitating or enabling aspects which would allow the effective exploitation of the technology in question.
- the importance of instituting training as an on-going process in the library is also vital for IT sustainability, and finally,
- the need for exploring a variety of ways in which adequate resources can be generated.

Freudenberg (1994) has also identified factors leading to the sustainability of donor-supported grain-processing technology projects in the Gambia and Senegal. Freudenberg's case study suggested a framework for looking at technology sustainability in the form of a "sustainability wheel". Her thesis is that factors responsible for the sustainability of any technology project are mutually interdependent. The assumption of her study was that although donors continue to support such grain-processing technology and other technologically-related projects (like information technology in this study), only in very few cases do they provide significant benefits to the intended users in the short term, and are not sustainable in the long term. She concludes that for any donor-supported project to be sustainable in the long run, it would depend upon multiple factors. As suggested by other studies, it is a combination of several factors or strategies which facilitate sustainability of an activity or project. The major ones she identifies are:

- i the need to establish or ascertain the existence of effective demand (felt need), on the part of the recipients of the intended technology to be acquired,
- ii the dependability or reliability of the donor-assisted technology to accomplish functions or activities related to satisfying the felt need; and
- iii the availability of good and effective management, which in turn has to be a result of specialized training in technical skills and knowledge related to the technology in question.

Despite the fact that Freudenberg uses different words to express factors capable of effecting sustainability, there are similarities to what other studies reviewed above have identified. All these factors have been found to be crucial on the question of IT sustainability.

Another important aspect she adds to the factors she has identified is the need for solving contextual factors which impede the effective utilization of the technology. In summary, these include: improving the physical infrastructure in terms of supplies like electricity and other consumables; effective planning based upon a well-defined information policy; good institutional / organizational environment; instituting capacity building in terms of human

resources development; assessment of the resource capacity and infrastructural stability of recipient institution; knowledge of users or beneficiaries and their needs; obtaining both user / beneficiary and parent organization's support and the need for resource-generation by the institution. All these factors are important to this study. They comprise major issues this study could build upon and look for in relation to the sustainability of information technology in libraries under study. Most of the works that have been reviewed compromise on these sustainability facilitating factors or strategies.

A much larger study of factors effecting the sustainability of donor-supported projects has been that conducted by the World Bank (Valadez and Bamberger, 1994). The study was based on project case studies in which interviews, observation and actual participation of the researchers were the main methods used in collecting important data and information on the issue of sustainability relating to World Bank- supported projects. Although the information sector is not very much represented in its own right in the study, many of the assessed projects in the traditional sectors such as agriculture, health and education could assist this study to identify factors which could equally apply to IT sustainability in libraries. Some of these projects included information technology components as a vital, supporting technology to the projects. Factors which the study identified and recommended for consideration as regards the effecting the sustainability of these projects, and which may also have some lessons to donor-supported information technology projects in libraries seem to be similar as those already identified by other studies.

However, one important observation of the World Bank study, which has also been emphasized by this study, is the concern that while many donor-supported projects do develop quite elaborate systems for project implementation, quite often very little is done regarding attention to their sustainability after donor withdrawal. According to the study, this was considered to be surprising in view of the large numbers of donor-supported projects especially in developing countries. Very few of them have been able to continue delivering their intended services over their intended period or lifetime following donor withdrawal. The study which covered case study reports of about 557 World Bank-supported projects completed between 1986 and 1989 came up with the following propositions as necessary if

such projects of whatever nature were going to be sustainable.

According to the study, among the important factors with regard to project sustainability are:

a) firstly, strengthening institutional development, that is the developing and enhancing the capacity and capability of the institution in terms of resources; organizational management; and expertise to effect sustainability of the project.

b) secondly, achieving a balance in the use of the principal forms of capital or resources- namely, human, natural, cultural, institutional, physical and financial.

Other factors to consider are:

c) the institutional capacity of the recipient institution to sustain the delivery of services intended. This capacity would very much depend upon the quality and stability of financial resources for current and future capital expenditures,

d) the integration of project activities and services with those of the institution, and links to parent / community organization and beneficiaries. The importance of this is that it facilitates the project to mobilize the support of the mother or parent institution, both at local and international level is also which is equally essential to its sustainability. It is thus no wonder that what the World Bank identifies as strategies that can assist the sustainability of donor-supported projects confirm the findings of other studies reviewed earlier.

From several studies that have been conducted on the issue of sustainability, a wide range of solutions in the form of strategies specifically on effecting sustainability have been proposed. Despite the fact that different studies have used different words to express or propose these solutions, one observation common to almost all of them is that there is some agreement on problems as well as solutions / strategies towards effecting sustainability which could prove relevant even to this study. From these propositions, this review has been able to consolidate

or come up with the following sustainability strategies. These include:

- the need for a clearly defined information policy in a library's setting which takes into account the primacy of user information needs. It is these variables that the overall planning of the library services including information technology, should be based. This would be extremely crucial in enhancing use and, facilitating user and institutional support for IT hence its adequate funding.
- the need and importance of involving recipients in the design, formulation, planning and implementation of IT projects in libraries in order to accommodate their needs and raise the management capability necessary for the future sustainability of such projects.
- the need for creating management systems within the library through which IT policy could be implemented. In other words, to ensure that there is institutional viability capable of facilitating effective organization so as to avoid confusion in implementing IT related roles and responsibilities.
- the need for effective support in terms of resources from the parent organization to the library in relation to IT sustainability.
- the need for ensuring that the institution has resource sustainability in terms of funds, expertise, managerial and capacity which would support the sustainability of the technology.
- the need for exploring alternative sources towards adequate resource generation by the institution sustaining the technology or project.
- the need for human resources development, that is working out IT management training and skills strengthening strategy. This would be important in strengthening the capacity of the library in terms of expertise; skills and competence required for sustaining information technology.
- need for professional commitment and innovativeness among the library staff towards the development and sustainability of the technology.

Based on the assumption that the proposed strategies can in fact also imply problems which could affect sustainability, the following problems were therefore identified and consolidated from this review. They include:

- Problems emanating from lack of institutional information and information technology policies. Without these, appropriate library or information development projects like the development and sustainability of information technology, cannot evolve and be achieved unless there are proper library plans and structured strategic planning mechanisms within an appropriate policy framework. The role of planning based upon clearly defined information and IT policies accompanied by efficient library / information management are critical to IT and general library sustainability
- Related to the above, are problems related to lack or scarcity of resources. These, and also ways in which they could be solved have been identified by the literature. A number of strategies towards resource-generation and sharing have been proposed by the literature. The biggest problems in achieving this, however, have been lack of professional commitment and innovativeness, and inability to try new ideas on the part of library / information management and professionals. Even with these qualities among information professionals, the absence of proper information / IT policies and defined mechanisms of planning library resources and services hampers effective implementation of various strategies towards the generation of adequate resources for information services and facilities including IT.
- The absence of stakeholder support to information services in terms of the necessary inputs like funds and other resources, is another problem reflected by the literature. This results from the lack of awareness of the role and value of information among the library parent organization management, users and other stakeholders whose support is important to put information technology and services higher on the agendas of managements for effective moral and particularly resource support.
- Lack of continuous assessment of user needs and information technology by the libraries is cited as another factor for the non-support of information services and IT. It was argued that information (and therefore IT) acquires



value only when it satisfies the particular information needs of users. User support to information and IT in terms of the required resources, is thus dependent upon the value they attach to information and related IT.

- Lack of adequately IT trained library human resources, and continuous analysis of IT skills shortages and absence of library plans to overcome them are also bottlenecks militating against effecting the sustainability of for example, information technology. However in addition to other problems discussed in the review, the literature has emphasized the absence of information and IT policies in libraries, as the biggest problem through which the implementation of other sustainability strategies in a planned manner could be effectively conceived by the libraries.

## **2.6 Summary**

The review of literature has established that the sustainability of donor assisted projects including IT projects in this case, could be feasible as long as recipients implement a number of proposals as identified in the review. Despite the fact that there is limited literature on the sustainability of donor-supported IT projects among libraries, studies dealing with the same issue in other sectors have come up with several proposals which could be equally relevant to this study. The literature identifies several problems affecting sustainability. In addition to those discussed in the literature, major ones include the absence of information and IT policies which in turn affect effective planning of services and the development and sustainability of the technology; scarcity or complete lack of resources; absence of user needs and information technology assessment; and problems associated with personnel inadequately trained in IT. Since problems affecting sustainability implicitly reflect their solutions in terms of strategies, the review has also tentatively identified these strategies.

Findings from the review indicate that in almost all the studies consulted, strategies and related problems affecting sustainability seem to be identical or similar. In other words, there is some agreement among various studies consulted, particularly on problems affecting sustainability as well as their solutions. This suggests that the sustainability of information technology could also be effected by trying to implement strategies similar to those identified

by the review. Another equally important observation has been that there is no single sustainability strategy (or problems) which can effect (or affect) sustainability on its own, but a range of strategies (and problems) combine to effect (or affect) sustainability.

Based on the above finding all the studies reviewed came up with several sustainability proposals, strategies and problems. Consequently, not only identified sustainability problems but also related strategies therefore formed key issues upon which to base the investigation on the sustainability of IT in academic and research libraries in Tanzania. Sustainability has now become a concern for both donors and recipients alike and therefore an issue which requires concerted action and attention. It can be argued further that although libraries in this study are faced with resource constraint (hence the need for donor support in IT acquisition and development) the need for sustainability of information technology and other library services and resources is important. The fact that donor support to libraries is becoming narrower and no longer dependable implies that libraries need to find alternative ways of sustaining their facilities as well as information services in order to justify their role and value in their parent organizations. What should be stressed here is for concerned libraries to realize that IT sustainability should be perceived and conceptualized as a problem whose solution cannot be postponed. As discussed earlier, this study recognizes the role donor agencies have played in IT acquisition and development in these libraries, but the literature points to the need for sustainability of IT. It has to develop in a planned manner and respond effectively to user information needs. Consequently, this could lead to future self-reliance in information technology development and its use and ultimately, reduce libraries' vulnerable dependence upon unpredictable donor support, hence the importance of this study.

## 2.7 References

- Adams, R. J. 1989. **Information technology and libraries: a future for academic libraries.** London: Croom Helm.
- Agha, S. S. 1992. **Sustainability of information systems in developing countries: an appraisal and suggested course of action.** Ottawa: International Development Research Centre, (IDRC) - Manuscript No.316e. ( Research report commissioned by IDRC - Canada).
- Agha, S. S. and S. Akhtar. 1992. The responsibility and the response: sustaining information systems in developing countries. *Journal of information science*, vol.18 (4): 283-292.
- Akhtar, S and K. Melesse. 1994. Africa, information and development: IDRC's experience. *Journal of information science*, vol.20 (5):314 - 322.
- Amadi, A. 1981. **African libraries-western tradition and colonial brain washing.** Metuchen: Scarecrow.
- Baker, D. 1992. Resource allocation in University libraries. *Journal of documentation*, vol.48 (1): 1-19.
- Ballantyne, R. 1994. Bridging the gap between practice and policy: policy challenges for agricultural information specialists. *Quarterly bulletin of the international association of agricultural and information specialists*, vol.19 (1-2): 24-29.
- Bean, G. J. P. 1994. Foreign aid and development in South Africa: four illustrative case studies in Kwa-Zulu Natal. MA Thesis. (Unpubl.), Department of Political Studies, University of Natal, Pietermaritzburg.
- Bender, D. R. 1993. A strategy for international information policy. *Libri*, vol.43 (3): 210-231.
- Bossert, T. J. 1990. Can they get along with us? Sustainability of donor-supported health projects in Central America and Africa. *Social sciences and medicine*, vol.30 (9): 1015-1023.

- Business international*. 1988 / 1990. Aid, finance update: Africa. (March, 1988 and July, 1990).
- Camara, A. B. 1988. Implementing the information technology strategy for Africa: the first stages. *Information development*, vol.6 (1): 55-61.
- Coombs, P. H. 1985. **The World crisis in education: the views from the eighties**. Oxford: Oxford University Press.
- Farrel, D. 1979. Do Multinational corporations really transfer technology? Brown, K.R.(ed.) **Integration of science and technology with development**. New York : Pergamon.
- Feudenberg, K. 1994. New technology for rural women: paradoxes of sustainability. *Development in practice*, vol.4 (1): 13-22.
- Hotteling, C. 1931. The economics of exhaustible resources. *Journal of political economy*, vol.39: 137-175.
- International Development Research Centre (IDRC). 1989 **Sharing information for development: IDRC's information strategy for Africa**. Ottawa: International Development Research Centre. (Technical study No.64e,f).
- International Union for the Conservation of Nature and Natural Resources (IUCN). 1987. **World conservation strategy**. Gland, Switzerland.
- Kibirige, H. M. 1992. Information technology transfer to developing countries: problems and prospects for the 1990s. Proceedings of the conference on: **Library and information services for future development of Southern Africa**, edited by A. G. Coetzer, Pretoria, South Africa, 6-8th May, 1992. Pretoria : Info Africa Nova CC. pp. 536 - 549.
- Kluzer, S. 1990. Computer diffusion in Black Africa- a preliminary assessment. Proceedings of the IFIP TC9 / TC8 working conference on: **The impact of information systems on developing countries**. Edited by S.C. Bhatnagar and N. Bjorn Andersen, New Delhi, India, 24-26th, November 1990. Pp 175-188.
- Levey, L. 1993. **A profile of research libraries in Sub-Saharan Africa**. Washington, D.C. : American Association for Advancement of Science.

- Lindner, W. 1987. Editorial (Guest editor). *Development; journal of the society for international development*, vol.2 (2-3): 3-5.
- Line, M. 1986. The survival of academic libraries in hard times: reactions to pressure, rational and irrational. *British journal of academic librarianship*, vol.1 (1): 1-17.
- Lishan, A. 1993. Sustainable academic networks in Africa: a systems' operators perspective. **Electronic networking in west Africa**. (Report of a workshop). Accra, 15-17th, December 1993. Washington, DC.: American Association for the Advancement of Science. pp. 27-42.
- Mangheni, P. J. 1993. The role of information technology in African development strategy: prospects for IT applications in Africa. *African techno-development bulletin*, vol.12: 1-17.
- Mchombu, K. and K. Miti. 1992. Formulation of national information policies for Africa: some unlearnt lessons. *International information and library review*, vol.24: 137-171.
- Mgaya, K. 1994. Development of information technology in **Tanzania**. E. P. Drew and G. F. Carter (eds.), **Information technology in selected developing countries**. Tokyo: United Nations University.
- Moore, C. and E. Newbigging. 1983. The UK Overseas Development Administration and non-departmental public bodies in the field of education aid. *Public administration and development*, vol.2: 31 - 44.
- Morss, E.R. 1984. Institutional destruction resulting from donor and project proliferation in Sub-Saharan Africa. *World development*, vol.12 (4): 465- 470.
- Mulira, N. K. 1995. Managing information technology in **Uganda**: strategies and policy formulations. *Information technology for development*, vol.6: 95-105.
- Newa, J. M. 1993. The sustainability of information technology innovations; CD-ROM technology at the University of Dar-es-Salaam. Proceedings of the workshop on: **Survival strategies in African University libraries: new CD-ROM technology in the service of information**. Organized by the University of Zimbabwe / American Association for the Advancement of Science, Harare, Zimbabwe, 2-5th August pp. 77-83.

- Pimienta, L. 1993. Research networks in developing countries: not exactly the same story. Proceedings of the **iNET'93**: INTERNET Society, 1993.
- Priestley, C. 1993. **SAREC library support programme; evaluation and review: Ethiopia; Mozambique and Tanzania**. Stockholm: Gotab. (SAREC Documentation Series, 1993: 1).
- Rebredo, J. T. M, Botelho and M.B. da Cunha.1991. Some problems involved in the installation of advanced information systems in developing countries. *Resource sharing and networks*, vol.6 (2): 81-95.
- Robinson, N. A. 1993. The factors involved in creating a sustainable academic / research networks in **Zambia. Electronic networking for West Africa**. Report of a Workshop. Accra, 15-17th, Dec.1993. Washington, D.C : American Association for the Advancement of Science. pp. 43-74.
- Rondinelli, D.1986. **Development management in Africa: experience with implementing agricultural development projects**. (AID special evaluation study, No.44). Washington, D.C: USAID.
- Rosenberg, D. 1994. Can libraries in Africa ever be sustainable? *Information development*, vol. 10 (4) : 247-251.
- Rosenberg, D. 1996. **African University libraries in Africa: a review of their present status and future potential**. (3 volumes). London: International African Institute.
- Sisaye, S. 1982 . Swedish development aid policy: a discussion with reference to Ethiopia. *Public administration and development*, vol.2 (2): 147-167.
- Stefanini, A. 1995. Sustainability; the role of NGOs. *World health forum*, vol.16: 42-46.
- Thompson, P. 1993. Building sustainability into agricultural information projects in small developing countries. *International agricultural association of librarians and documentalists quarterly bulletin*, vol.38 (2-3): 75-77.
- Valadez, J. and M. Bamberger. 1994. **Monitoring and evaluating of social programs in developing countries**, (Chapter six). Washington, D.C : World Bank. pp.183 - 205.

Watson, K. 1993. Changing emphases in educational aid. *Comparative education review*, vol. 36 : 59 - 84.

World Commission on Environment and Development (WCED). 1987. **Our common future**. Blank, Switzerland.

Zulu, S.F.C. 1994. Africa's survival plan for meeting the challenges of information technology in the 1990s and beyond. *Libri*, vol. 44 (1) : 77-94.

# CHAPTER 3

## RESEARCH METHODOLOGY

### 3.1 Introduction

The overall purpose of this study was to explore and investigate the status of information technology and strategies which academic and research libraries in Tanzania can apply to ensure and / or facilitate the sustainability of IT which has largely been acquired through external donor assistance. Sustainability of information technology is critical given that donor agencies have had strong influence in the acquisition and introduction of information technology in these libraries (Baker, 1993). Experience has shown that once the project cycle is complete and donor(s) withdrawal(s), the ability of recipient organizations, like libraries to obtain, maintain and ensure continued use of the information technologies, have tended to decline substantially. In some instances the application of donor-funded technology has become completely unsustainable (Agha, 1992; Rosenberg, 1996).

A recent study on the current state and future potential of African university libraries towards their general sustainability (Rosenberg, 1996:10) observed that so far in most of the libraries, library sustainability was still totally a new idea among donors, librarians, and users alike, and no one had ever even discussed or thought about it. Her observation implies the dearth of literature or data documenting experiences of libraries with regard to IT's future sustainability. Two more studies (Baker, 1993; Mhina, 1995) which have studied IT use in various organizations and libraries in Tanzania, have confirmed the similar view despite both acknowledging the role of donors as having stronger influence in introducing and supporting information technology use than the recipients. Baker (1993:3) for example, in his survey study on information technology in Tanzania concluded that :



Donors are a powerful influence in Tanzania. In 1990 total external assistance stood at 46.6 % of the Gross Domestic Product. Most of the aid projects have some part of the budget allocated for computers and IT related services. Due to this their policies on acquisition of computer equipment, IT and services personnel are influential and should be considered in any evaluation of the information technology industry in Tanzania (Baker, 1993: 3).

Given the fact almost all the donor-supported projects have had some part of the budget allocated for computers and IT related services in organizations and libraries alike. One would therefore argue that the issue of sustainability of information technology is a critical one. Even in the studies mentioned earlier, the issue of IT sustainability has not been dealt with either from the view of recipients or donors of the technology despite the latter's stronger influence on all aspects of information technology development in the country.

The absence of adequate, relevant literature and empirical studies on the problem of information technology sustainability in developing countries in general and Tanzania in particular, meant that there was little basis upon which one could formulate strategies for IT sustainability among Tanzanian libraries. In effect the study of the problem in Tanzania was an exploratory one, based upon inductive theory. It was intended to generate baseline data, explain the phenomena and identify factors useful for the generation of strategies for sustainability of information technology. Therefore the most relevant methodology chosen for this study was the survey method.

## **3.2 Research design**

According to Selltitz, *et. al.* (1976: 90) a research design entails the arrangement of conditions for the collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. This being the case it was the research purpose and objectives of the study at hand which had to inform the type of the research design for this study to achieve its intended purpose and objectives. This study was exploratory in nature. It is intended to examine what was taking place in the libraries themselves in order to maximize on their experience by obtaining data and information as regards what potential strategies could lead to the sustainability of information technology. Given the nature of the

research problem and the purpose of the study, it was felt that the most appropriate methodological approach for an in-depth study of the problem was to conduct a survey research. Busha and Harter (1980: 62) state that survey research is capable of collecting background information and hard-to-find data, and the researcher therefore would not have the opportunity to motivate or influence respondents' responses. Sproull (1995: 30) recommends the technique as being appropriate especially when attitudes, ideas, comments and public opinion on a problem or issue were being studied. In the scope of this study the strategy was justified as it allowed the researcher to collect a broad array of data and information through the use of more than one data collection instruments from all or part of the population identified. The collected baseline data and information provided the researcher with an important base upon which strategies towards IT sustainability among Tanzanian libraries could be formulated.

Furthermore, the strength of the survey method was also evident in its ability to study, describe, explore and analyze relationships among geographically scattered subjects like the libraries in this study were. As a result, the researcher could generalize from a small group to a large group from which the sub-group had been selected. In the case of this study, the entire population identified for the study was investigated through completing the questionnaires. In the case of interviews only twelve libraries were selected. The selection of the twelve libraries was based on several criteria. These included the period for which a library had been using (or interacting with) information technology in its information services which in turn reflects IT experience of its staff members; the amount of information technology possessed by the library and finally, the proximity of the library to the researcher's base. In order to accomplish the above-mentioned research design, the following research tools were used in data collection.

### **3.2.1 Data collection instruments**

The study adopted the self-administered questionnaire as the main data gathering technique. This was supplemented by a face to face interview which was highly selective of the interviewees. The interview was considered necessary in order to supplement the

questionnaire in probing and obtaining clarification on issues where responses to the questionnaire might be ambiguous or complex. In addition, observation of the actual status of information technology in some of the libraries was also undertaken during the distribution and collection of the questionnaires, and when conducting interviews with the heads of some libraries. The use of more than one data gathering instrument that is the triangulation method, was considered vital for this study when considering the under-researched nature of the problem being investigation.

Prior to the administration of these instruments, a thorough review of related literature on the problem was undertaken in order to find out what had been done to address the problem and more importantly, to identify studies that had used surveys, questionnaires and interviews as this study has done. It was crucial to find out whether such methodologies were effective in their investigation and whether there was any aspect of the methodologies used which this study could adapt.

These included works by Agha (1992); Agha and Akthar (1992); Baker (1993); and Rosenberg (1996). Other studies were based on theoretical discussions of the issue of sustainability. These helped this study by identifying some relevant and key sustainability issues which could be included in the design and fine-tuning of the instrument questions. Although these works assisted in identifying specific sustainability issues to be probed in the research instruments, one of their major shortcoming was that, with very few exceptions, they investigated or discussed the issue of sustainability in relation to other sectors or fields of study other than information or information technology.

### **3.2.1.1 The questionnaire**

The choice of the questionnaire as the main data gathering instrument resulted primarily from the advantages it provides when compared to other types of instrument. Apart from facilitating accessibility, since it permits wider geographical contacts, it can also facilitate the collection of large amounts of data and information in a relatively short period of time (Powell, 1985: 90). Kidder, *et. al.* (1986:22) have observed also that questionnaires normally

give respondents a greater feeling of anonymity which in turn encourages openness to questions and minimizes the interview bias. It is also a valuable instrument especially for a population that is literate and reasonably able to deal with items contained in the instruments. Library managements, especially directors or chief librarians of libraries engaged in the study, were the individuals targeted to complete the questionnaire. This was important for the study in that these were knowledgeable and professionally experienced people. In addition, they hold important management positions crucial to decision-making and formulation of policies affecting all aspects of library and information services. As a result, the researcher was confident that these were ideal individuals who could adequately complete a self-administered questionnaire and provide relevant and useful data and information on the subject being investigated.

#### **3.2.1.1.1      *Design of the questionnaire***

The nature of the questionnaire was highly unstructured, with very few structured or categorical questions. This was intentionally done and considered useful for two main reasons.

Firstly, because the problem was under-researched, such questions could solicit original and adequate data and information which was not readily available from the literature. Secondly, the nature of the study itself necessitated such questions as it was mainly exploratory, intending to examine various dimensions and facets of the problem. This allowed respondents in answering questions to give as much detail as they liked and also to clarify and qualify their answers as necessary. This purpose corresponds with De Vaus' (1986: 154) recommendation for example, that instead of the researcher forcing respondents to choose between rigidly limited responses, open-ended questions permit them to answer freely and fully in their own words and their own frame of reference. In addition, Busha and Harter (1980) have recommended the use of such questions for studies which are basically exploratory in order not only to achieve depth in areas and issues being investigated, but also to clarify and qualify complex issues, and expand on responses. Line (1982: 62 -63) on the other hand, maintains that the combination of both unstructured and structured questions has

an advantage in that it increases the reliability of the responses. He asserts that:

...the use of structured and unstructured questions in combination is well established as a method of obtaining data, and is believed to increase the reliability of the responses (Line, 1982: 62 - 63).

Finally, in data analysis unstructured questions are considered to be extremely useful especially when categories are unknown or when too many categories need to be created. In this sense, the researcher would be more independent and could at his / her discretion create adequate and more appropriate categories that would suit the research problem in question. This is what was done, given that there were no ready-made categories one could turn to particularly for this study when analysing the data.

Unstructured questionnaires have also disadvantages. These include among others: the low response rate; questions sometimes being misunderstood; achieving less uniformity of measurement hence less reliability; and the responses given by respondents are final and cannot be probed or qualified unless if supplemented by the interviews, as this study had done. Other problems are that unstructured questionnaires are extremely difficult and time-consuming in data analysis. This is because answers from unstructured questions require categorizing and summarizing. In case of this study, the advantages of unstructured questions outweighed those of structured questions. Therefore, most of the questions were unstructured. Much attention however, was taken to ensure that the above-mentioned disadvantages were minimized to a large extent. This included the combination of very few structured and more open-ended questions in the questionnaire which increased the reliability of the responses (Line, 1982: 62-63). The triangulation technique mentioned earlier in section **3.2.1** of this study was also an attempt to do away with the shortfalls associated with questionnaires in research. On the other hand, the questionnaire also checked the shortcomings of the interview, such as the interview bias and those associated with observation by the researcher him or herself.

The design of the questionnaire and the interview schedule was largely based upon the research objectives which in turn informed the formulation of the five major research questions which guided the study. The research questions were:

1. What was the current status of information technology in libraries under study with regard to:
  - a) information technology available?
  - b) personnel?
  - c) information services being offered?
2. How was information technology acquired; who financed seed-money for IT equipment and for its future sustainability?
3. What and whose policies were determining the use of available information technology in libraries?
4. What have been the bottlenecks in the use and sustainability of the technology, and how were those problems being and / or anticipating solving them?
5. What strategies were in place and / or could be put in place in effecting the sustainability information technology for its long-term use?

Based upon the above-mentioned sequence the design of the questionnaire (Appendix B1), was structured in the following logical order:

- **Part One of the questionnaire ( Items: 1 to 3 )**

Intended to provide the researcher with basic background information on the population of the study in relation to the nature, type and users of the libraries under study. Such information was essential in the context of this study as it provided important working knowledge on the libraries.

- **Part Two of the questionnaire ( Items: 4; 7; 9; 11; 13; 15 and 17 )**

Intended to provide detailed information on the status of information technologies, both hardware and software which were available in libraries with reference to their total numbers, types, models and makes of the technology. These questions responded also to research question number one and partly number two of the study namely, the status of information technology available in the concerned libraries and also partly on sources of information technology funding.

- **Part Three of the questionnaire ( Items: 4 -7; 10; 12; 14; 16; 18 -24 )**

Intended to respond to research question number two of the study, on the manner in which IT was being acquired; sources of IT funding, both local and external; the IT acquisition trend, 1986 - 1996; donor organizations responsible for IT acquisitions by libraries. Furthermore, the questions tried to gauge the extent to which both local and external funding sources respond to information technology development in libraries as regards: the acquisitions, maintenance, updating and general contribution to its sustainability.

- **Part Four of the questionnaire ( Items: 25-31 )**

Solicited data on issues related to decision-making with regard to policies affecting IT selection and its subsequent use in libraries. Given the infancy of the IT projects in libraries, it was assumed by this study that donors and not library managements still had the upper-hand in decision-making on matters affecting information technology selection as well its use (Baker, 1993: 3). How this decision-making relationship between donors and the recipient libraries influenced IT's future sustainability therefore became an aspect for investigation. Hence the questions on policy issues of IT selection and use.

- **Part Five of the questionnaire ( Items: 30 - 38 )**

Asked key questions to the research problem at hand, collecting data relating to research questions four and five of the study, namely, whether the sustainability of information technology was feasible or not, and if feasible, what the basic conditions could be; and ways or strategies which could accomplish it. Furthermore, data on possible problems and their anticipated solutions to be experienced by the libraries in effecting IT sustainability was also solicited. The questions also sought general views and suggestions or recommendations as regards IT sustainability in academic and research libraries in Tanzania.

### **3.2.1.2 The interview schedule**

The interview schedule comprising five general questions intended to supplement the main data gathering tool (the questionnaire) was also compiled (Appendix B2). This was considered essential not only as a supplement to the questionnaire in obtaining data and information, but also to offset the disadvantages associated with the use of questionnaires as data gathering methods, discussed under section 3.2.1.1 in this study. The interview was also

important because some persons asked to complete a questionnaire, tend to delegate this task to junior members of staff who may not be capable of supplying the needed data and information. Since in this study all the methods proposed for use in the gathering of data were original in formulation, that is, have not been adapted from any previous study of this nature, it was considered appropriate that the combination of more than one method that is, the triangulation technique in data gathering could yield much more reliable and in-depth data and information.

Like the questionnaire, the interview targeted heads of libraries or their deputies from whom in-depth probing by the researcher could be made and clarification of issues relating to the research questions and the problem in general could be obtained. These interviewees were considered ideal for the study as they are well-informed on issues pertaining to information technologies in their libraries. Furthermore, as indicated earlier, they hold responsible management positions which determine decision-making, policy formulations and the allocation of resources within their libraries. The administration of the interview was face-to-face after an interview schedule had been provided to the interviewees one week before. In some instances they preferred to provide the researcher with additional previously written responses to the interview questions. These were later clarified during the course of the interview. Interviews were conducted during the months of August and September, 1996. A total of 12 individual librarians with varying professional experience and / or academic qualifications were interviewed. The selection of the libraries for the interview was based upon the criteria as identified in section 3.2 of this study.

### **3.2.2 Pre-testing of the research instruments**

Drafts of the research instruments (questionnaire and interview schedule) were developed in consultation with the researcher's supervisor. They were further reworked and discussed with colleagues before they could be pre-tested in Dar-es-Salaam. Through all these mechanisms it was possible to come up with appropriate instruments suitable for data gathering. A "trial run" was also considered necessary despite the fact that the instruments had been discussed and reworked. Balian (1982: 90) recommends a "trial run" especially if the research



instruments were original in formulation and have not been adapted from any previous study examining a similar or related problem. The “trial run” was intended to critically analyze the appropriateness, clarity and conciseness of the instruments, assess the framing and wording of the questions and obtain views and suggestions on the overall design and logical progression or sequence of the questions before the instruments is administered. According to Line (1982: 47) a trial run or (pilot study) in any research is important because it can show up faults in the design of the questionnaire and in the framing of the questions. Furthermore, it can help to indicate the probable range of answers to expect especially to open-ended questions. The “trial run” was conducted in June 1996 among 10 library academic staff of the University of Dar-es-Salaam library. These members of were considered to be an appropriate sample for testing the research instruments as they were practising information professionals, have been in interaction with information technologies since 1989 and were also conversant with the demands of research such as this. Given these criteria it was anticipated that they could assist the researcher in the final development of appropriate research instruments for the research at hand. None of these ten staff members were included in the actual data collection for the study. Views and criticisms obtained from the trial run were incorporated into the instruments wherever it was felt necessary in order to improve them. These included the recombination and removal of some of the questions which appeared to be repetitive and a more logical arrangement of the questions in the instruments.

### **3.3 Population of the study**

A “population” in a research study can be defined as: the aggregate of all the cases that conform to some designated set of specifications (Leedy, 1980: 98). Busha and Harter (1980: 55-57) agree with the above definition of a “population” in a research study, but add another dimension which should be taken into account particularly when determining an appropriate size of the population for research. They assert that a population comprises any set of persons or objects that possess at least one common characteristic and “that a population can be very large or small, depending upon the size of the group of persons or objects from which the researcher plans to make inference”. Within the context of this study, the set of specifications

and characteristics for the population of the study were firstly:

- a. Academic libraries: those belonging to universities, polytechnics and colleges, excluding those of primary and secondary schools.
- b. Research libraries: consisting of specialized information sources and documents and providing facilities for undertaking investigation. These may also provide referral services in support of studies in subject fields connected with development, testing and evaluation as well as research.

Secondly, institutions included were those owning and using information technology in the processing, organization and dissemination of information and related services. Another important characteristic was that they had to belong or be affiliated to local Tanzanian institutions or organizations which in turn provide their funding. These characteristics were vital in order to exclude school libraries at primary and secondary levels, and also libraries belonging to foreign embassies and organizations or institutions which are capable of sustaining the information technology they have.

In order to determine the target population of the study, a number of methods were used when taking into consideration that very few academic and research libraries in Tanzania are known to own and use information technology. These methods included:

- i A review of currently existing previous research work and articles. The following were found to be useful:

Sheya, M. S. and G. R. Koda (1988) "The state of informatics in Tanzania: policy issues and strategies"; Baker, S. (1993) **The survey of information technology in Tanzania**; and Mhina M. H. (1995) **Factors affecting the introduction of information technology at the Institute of Finance Management (IFM) library**.

While names of institutions including libraries having information technology are identified here and there in these texts, Baker (1993: 121-174) has included an Appendix of all known institutions (about 1104) in the country having and using some form of technology. Mhina (1995) on the other hand, concentrated on libraries only, whereby an Appendix of 23 libraries of all types known to be having and using some form of information technology by 1995 is included

in his thesis.

- ii The use of available library and information centres directories. These included:  
the **Directory of libraries and information centres in Tanzania**, compiled by the Tanzania Library Association (TLA) in 1988. Although the document is dated, it provided vital information as regards addresses; categories of users, and nature of libraries. Also consulted was the **World guide to libraries**, in the series: **Handbook of international documentation and information**.
- iii Finally, personal visits as well as informal inquiries from librarians and institutions, such as the Tanzania Commission for Science and Technology, (COSTECH) were useful.

The use of all these methods have confirmed Baker's observation in his recent study that almost all of the libraries and organizations having and using information technology were located within the seven regions endowed with large commercial, educational, research and other institutional establishments (Baker, 1993: 16). According to his observation, 57% of all IT using organization units were situated in Dar-es-Salaam, while Arusha and Moshi (Kilimanjaro region) were second and third locations in terms of hardware density. Other regions in that order were Dodoma, Mwanza and Zanzibar. With this information obtained from these sources, a total of 18 academic and research libraries were identified out of 93 libraries operating in Tanzania. These were the ones that fulfilled the basic characteristics of being either academic or research libraries or both, owning and using information technology to process, organize and disseminate information to various types of users and being funded by a local institution or organization. Given the size of the population no sampling was considered necessary in the completion of the questionnaire. Except in undertaking interviews twelve libraries were selected being guided by the criteria explained earlier in this study. Moreover, including all identified libraries in completing the questionnaire that is, the entire sample at 100%, would maximize and stabilize the total sample size and sample characteristics. Busha and Harter (1980) agree that it is the nature of the particular research problem and population which normally determine the size and sample to be involved in the research process.

...a population can be very large or small, depending upon the size of the group of persons or objects about which the researcher plans to make inferences (Busha and Harter, 1980: 57).

This study therefore included all known academic and research libraries owning and using some form of the technology, forming 100% of the population. This was considered to be sufficient and appropriate for the purposes of data analysis for this study. The population included the following academic and research libraries, each with its abbreviation (representative code used in data analysis) in brackets. Arrangement of the libraries is not alphabetical as it depended on the extent of the amount of information technology possessed by each of the libraries.

- University of Dar-es-Salaam library (**UDSM** )\*
- Tanzania Industrial Research Organization library (**TIRDO**)\*
- Tanzania Commission for Science and Technology library (**COSTECH**)\*
- University College of Lands & Architectural Studies library (**UCLAS**)\*
- Institute of Marine Science, (Zanzibar) library (**IMS**)\*
- Institute of Accountancy, (Arusha) library (**IAA**)\*
- Muhimbili University College of Health Sciences library (**MUCHS**)\*
- Sokoine University of Agriculture library (**SUA**)\*
- Eastern, Central & Southern Africa Management Institute (**ESAMI**)\*
- Cooperative College (Moshi) library (**CCLM**)
- College of African Wildlife Management (**CAWM**)
- School of library, Archive & Documentation Studies (**SLADS**)
- Ministry of Agriculture library (**Min. Agr. H/Q**)
- Tanzania Gender Networking Programme library (**TGNP**)\*
- Rwegalurila Water Resources Institute library (**RWRI**)
- National Environmental Management Council library (**NEMC**)\*
- Economic and Social Research Foundation library (**ESRF**)\*
- Tanzania Food and Nutrition Centre library (**TFNC**)

Key \* : Libraries involved in the interview.

### **3.4 Administration of the research instruments**

The questionnaire together with letters of introduction from the Department of Information Studies, University of Natal and the Vice Chancellor, University of Dar-es-Salaam (Appendix A1 and A2) were distributed during the months of June and July, 1996 using registered mail, to libraries where it was not possible for the researcher to visit personally. In areas such as Coast, Dar-es-Salaam and Morogoro regions the researcher personally distributed questionnaires to the target population. These three regions accounted for 70% of the target population. Three weeks were granted to the respondents for the completion of the questionnaires. In a few cases this period was extended to one month due to postal delays and distance from Dar-es-Salaam where the researcher was based.

According to Bailey (1982: 162) reminders and personal follow-ups are universally agreed-upon techniques of increasing the response rates of questionnaires. These were made in the subsequent months of August and November, 1996. This was also the time the researcher visited and conducted personal interviews with heads or deputy heads of the sampled 12 libraries. (Libraries involved in the interview are asterisked in section 3.3). Personal visits to most of the libraries during the distribution and collection of the completed questionnaires and also conducting the interviews, provided the researcher with an opportunity to observe the realities of information technology in those libraries. In total 25 questionnaires were sent out and 18 of these were returned duly completed. Seven libraries out the 25 which received the questionnaire indicated that they had no computers at that moment. Some of these assured the researcher that acquiring computers was high on their agenda. Therefore returned questionnaires represented 100% of the population as well as the response rate, given that very few academic and research libraries in Tanzania have and use information technology. This response rate was adequate for this study, given the size of the population. Babbie (1992: 267) for example, recommends a response rate of at least 50% as being adequate for data analysis and reporting of research results. In the case of this study, the response rate obtained had easily exceeded that recommendation.

### 3.5 Data analysis

In this study the methods chosen for data analysis were mainly determined by the type of data collected, the purpose for which the study was conducted and as an attempt to meet the set objectives. As indicated earlier, much of the data collected by the research instruments was from open-ended or unstructured questions. In order to break up the responses (sentences) into information (content) bearing units for coding (that is, the unit of analysis) and classify the latter into mutually exclusive categories for subsequent analysis, the *content analysis* method was used. Because most of the questions in the research instruments that is the questionnaire and the interview schedule were unstructured, necessitated the application of content analysis to their responses in order to reach meaningful and interpretive inferences relevant to the research questions reflecting the problem being investigated by this study.

According to Powell (1985: 49) *content analysis* is the systematic, objective, quantitative analysis of the occurrences of words, phrases, concepts and the like, so as to analyse the expressed *content* that is, the inferences of the communication. Its operationalization would therefore involve the identification of the *unit of analysis* so as to identify, define and decide on a unit, such as a word, sentence, paragraph or theme. Krippendorff (1980: 57) observes that the identification of a unit of analysis or *unitizing* involves defining information bearing units, separating them along their boundaries, and identifying them for their subsequent later analysis. Such units are normally characterized by two major features. Firstly, it has to be the smallest unit of analysis bearing meaningful information, and should also have the ability to stand independently and make sense. Secondly, it should have the ability to guide the researcher to some form of understanding.

Another aspect of content analysis operationalization involves the creation or identification of mutually exclusive categories, that is categorization, into which, using the unit of analysis, the coding and tabulation of data could be made for subsequent analysis.

As another major technical step, and the most crucial aspect in the application of content analysis, is categorization. This could be defined as a process by means of which the unitized data is organized or grouped into categories which should provide descriptive or inferential information about the context or setting from which the units were derived. Categorization should normally be characterized by, being able to relate or bear a close relationship to the problem as originally stated, being exhaustive in that every recording unit relevant to the study could be classified and placed in one of the categories created and be mutually exclusive, in that no recording unit could be included in more than one category. It was therefore within these three aspects of being able to obtain and reach inferences from the textual responses, unitization and the categorization of data so that it could be finally analyzed, that content analysis application could be conceived and applied to free-text data analysis.

In the case of this study, these technical steps to the application of content analysis were worked out and applied in data analysis. The unit of analysis considered to be appropriate and suitable for this study was the theme, as it is more conceptually comprehensive. Furthermore, themes can be distinguished from each other and from the remaining portion of irrelevant materials because they possess the desired structural properties. In addition, the nature of questions asked involved explanations in simple sentences which could be appropriately analyzed based on the themes they revealed. Berelson (1954: 508) and Holsti (1969: 259) support this view that for many research purposes, the theme is the most useful unit of analysis as it can be easily identified in texts, especially in non-complicated simple sentences and paragraphs, or through interpretive judgements of textual responses by the researcher, which is also an integral part of content analysis.

Through these content analysis procedures, it was possible to go through the research questionnaire as well as the interview responses and discern common or identical themes relating to each of the questions. This was followed by placing or grouping them into related categories which were created for the purpose, followed by data analysis and the presentation dealt with in Chapter 4 of this study. The categorized data was further analyzed and presented in the form of descriptive statistics. The use of different statistical treatments in the analysis

of data responses as indicated in chapter 4, was basically determined by the different configuration characteristics revealed by the data itself, and the requirement of a particular question being dealt with in the research instruments. This applied to both open-ended and categorical questions used in data gathering. Through the use of various descriptive statistical presentations, including tables, it was possible to organize data into meaningful formats, summarize it into simpler accounts, and emphasize those features of it that were especially relevant to the requirements of the study. **Quatro Pro 6.1** (for Windows) software assisted in computing various values like percentiles and **Word Perfect 6.1** (for Windows) was used in the creation of tables which reflected the analyzed data into meaningful and presentable formats.

### **3.6 Summary**

This chapter has dwelt on the methodological approach the study used in order to accomplish data collection. As indicated earlier, the survey research method involving the self-administered questionnaire and the interview schedule were used as instruments for data collection. The rationale for the research method emanated from the nature of the problem being investigated, the appropriateness and advantages of the research method in relation to the problem, and the nature of the study itself, which as indicated, was an exploratory kind of study. Because the problem was under-researched, this implied that in-depth hard facts in the form of data and information on the problem could not be obtained unless respondents were provided with research instruments in which they could have freedom to express in detail and qualify their responses, based upon their own perceptions and experiences of the problem. This opportunity was facilitated by the questionnaire and the interview schedule which were mainly comprised of unstructured questions. Furthermore, the instruments (especially the questionnaire) provided the researcher with a speedy and effective way of gathering data, especially of a quantitative nature, on various aspects of information technology from geographically scattered academic and research libraries. The survey research method was further supplemented by personal visits to libraries when distributing and collecting questionnaires, and when conducting interviews there. This provided the opportunity to



observe and experience the actual status of information technology in the libraries concerned. The analysis of literature related to the issue of sustainability reinforced the exploration of key issues on sustainability and some aspects of methodologies used, which in turn facilitated the choice of the appropriate research methods to be used and the fine-tuning of the research instruments. The criteria upon which the identification of the population of the study was based were justified in relation to the objectives the study intended to achieve. They were effectively used and adhered to in order to come up with a population that represented similar characteristics or features. Finally, given the methods used in data collection the choice of which to a certain extent was influenced by methodologies identified in the review of literature and the free-flowing text responses received, it was necessary to apply content analysis in presenting the research results. Therefore, the nature of the problem being investigated, the research method and data-gathering instruments used and the methods of data analysis and presentation were all closely related.

### 3.7 References

- Agha, S. S. 1992 **Sustainability of information systems in developing countries: an appraisal and suggested course of action**. Ottawa : International Development Research Centre (IDRC). (Research report commissioned by IDRC-Canada). Manuscript No.316e.
- Agha, S. S. and S. Akhtar. 1992. The responsibility and the response : sustaining information systems in developing countries. *Journal of information science*, vol.18 (4) :283-292.
- Babbie, E. R. 1992. **The practice of social science**. (6th ed.) Belmont, California: Wardsworth.
- Bailey, K. D. 1982. **Methods of social research**. (2nd ed.) New York: Free Press.
- Baker, S. 1993. **The survey of information technology in Tanzania**. Dar-es-Salaam: Tanzania Commission for Science and Technology.
- Balian, E. S. 1982. **How to design, analyze and write doctoral research: the practical guidebook**. Lanham: University Press of America.
- Bartz, B.; H. Optiz and E. Richter. 1995. World guide to libraries (**Handbook of international documentation and information series**).Vol.8. Munchen : K.G. Saur.
- Belerson, B. 1954. *Content analysis*. In: G. Lindzey (ed.) **Handbook of social psychology: theory and methodology**, Vol.1. Cambridge, Mass: Addison-Wesley.
- Busha, C. H. and S. P. Harter. 1980. **Research in librarianship: techniques and interpretation**. New York: Academic Press.
- De Vaus, D. A. 1986. **Surveys in social research**. London: George Allen and Unwin.
- Edwards, A and R. Talbot. 1994. **The hard-pressed researcher: a research hand book for the caring professions**. London: Longman.
- Holsti, O. R. 1969. **Content analysis for the social sciences and humanities**. Reading, Mass: Addison-Wesley.

- Kidder, L. H.; C. M. Judd and E. R. Smith. 1986. **Research methods in social relations**. (5<sup>th</sup> ed.). New York: Holt Rinehart and Winston.
- Krippendorff, K. 1980. **Content analysis: an introduction to its methodology**. Beverly Hills: Sage Publications.
- Leedy, P. D. 1980. **Practical research: planning and design**. New York: Macmillan.
- Line, M. B. 1982. **Library surveys an introduction to their uses; planning; procedure and presentation**. London: Bingley.
- Mhina, M. H. 1995. **Factors affecting the introduction of information technology at the Institute of Finance Management (IFM) library**. MA (Unpubl.). Department of Information Science, University of Sheffield, Sheffield.
- Mgaya, K. 1994. Development of information technology in **Tanzania**. In: E.P. Drew and G. F. Foster (eds.) **Information technology in selected developing countries**. Tokyo : United Nations University.
- Powell, R. R. 1991. **Basic research methods for librarians**. Norwood, New Jersey: Ablex.
- Rosenberg, D. 1996. **University libraries in Africa: their current state and future potential** - case studies, Vol.2. London: International Africa Institute.
- Selltiz, C., L. J. Wrightman and S .W. Cook. 1976 **Research methods in social relations**. (3<sup>rd</sup> ed.). New York : Holt, Rinehalt and Winston.
- Sheya, M. S. and G. R. Koda. 1988. The state of informatics in Tanzania. In: Tanzania, Ministry of Finance, Economic Affairs and Planning, Seminar on: **The contribution of informatics to economic development**. Arusha, Arusha International Conference Centre (AICC), 10 - 12th August, 1988. (Official report).
- Sproull, N. L. 1995. **Handbook of research methods: guide for practitioner and students in the social sciences**. (2<sup>nd</sup> ed.). Metuchen, New Jersey: Scarecrow.
- Strauss, A. L. and J. Corbin. 1990. **Basics of qualitative research: grounded theory procedures and techniques**. Newbury Park, California : Sage Publications.

# CHAPTER 4

## PRESENTATION OF RESEARCH RESULTS

### 4.1 Introduction

The main concern of this study was to investigate the status of information technology and the feasibility of academic and research libraries in Tanzania attaining the capacity to sustain information technology they currently use, or that they may acquire in the future which is / has been largely acquired through external donor assistance. This problem becomes more critical for libraries especially with the eventual withdrawal or abrupt ending of donor support to these information technology projects. Concerned libraries would therefore be forced to look elsewhere for ways, means and strategies of sustaining the technology in order to continue offering IT related services. To these libraries, information technology sustainability is crucial if they are to continue attracting the current and future potential users of their services. Since library users had already been introduced to IT services and products, they would expect to continue enjoying the same improved services regardless of whether donor funding to information technology existed or not. It is at this critical moment that information technology sustainability becomes more important for libraries in order to maintain user confidence and support for library activities. It is this support that in turn justifies the existence and value of the library within its parent organization or institution.

In order to identify and suggest alternative ways or strategies to IT donor funding, a survey was conducted among 18 libraries to try and find answers to the five research questions which reflected the problem being investigated. The questions were:

1. What was the current status of information technology in libraries under study with regard to:

- a) information technology available?
  - b) personnel?
  - c) information services being offered?
2. How was information technology acquired, who financed seed-money for IT equipment and for its future sustainability?
  3. What and whose policies were determining the use of available information technology?
  4. What have been the bottlenecks in the use and sustainability of the technology, how were those problems being and / or anticipating solving them?
  5. What strategies were in place and / or could be put in place in effecting the sustainability of information technology for its long-term use?

Based upon these five research questions, the research instruments (a questionnaire and an interview schedule) were devised, intended to provide answers to these questions.

The aim of the present chapter is therefore to present the analysis of data obtained from the field. It also presents the results accruing from the analysis of that data. While the purpose of each question or group of questions or questionnaire items was given as they related to providing information on a particular research question, the general procedure adopted in the analysis of data was based upon the following aspects:

- i the grouping and therefore, combined analysis of related questions under various sub-headings to which such questions provided answers,
- ii where (i) was thought to be inappropriate or did not make logical sense in the analysis, the chronological order of the questions or items as arranged in the self-administered questionnaire was followed.

However, in most cases related questions and items are logically combined to facilitate both the analysis and organization of data into meaningful formats, summarize it into simpler and

meaningful accounts and identify possible relationships among the variables. This arrangement also facilitates easy reading of the chapter. In situations where some questions require detailed analysis, explanations in the form of discussion are given so as to make the analysis more intelligible in relation to the study.

## **4.2 General background information on the libraries**

The first three items of the self-administered questionnaire were designed to provide the researcher with background information on the libraries being studied: their nature and the types of users of the information services provided by the libraries. This information was essential as on the one hand it provided working knowledge of the characteristics of the population being studied, and on the other, necessary information on the nature and level of information services and products the libraries provided. Furthermore, it was hoped that such information could provide clues to decisions affecting the way and extent to which information technologies were being used in those libraries. For example, the larger the number of users served by a given library the more they might influence library management decisions on whether the users should have direct access to the technology available, or whether library staff should act as intermediaries when users requested IT-related services. Indirectly, such decisions would have an influence on how the whole issues of the care of IT and general maintenance procedures are dealt with by a library. These could be some of the aspects to take into consideration when planning IT sustainability in these libraries. The following sub-sections thus present the findings of the survey in relation to the first three items of the questionnaire.

### **4.2.1 Nature of libraries**

Requesting libraries to indicate their nature emanated from the fact that it is normally the nature of a given library which in most cases, determines the type of information, kind of information activities or functions a library offers. Furthermore, the nature of a library may also influence not only the kind of information sources and related processing technology that

has to be acquired, but also the type of users it serves. For example, a university library which intends to serve the information needs of students at undergraduate level would reflect this aspect in the variety and level of information sources it would acquire, and perhaps the level at which the required information is processed. Similarly, a special library intended to meet the information needs of researchers only at a particular level, and in a specialized field like medicine, would tend to reflect its nature in the type of information resources it acquires, and the appropriate technology for accessing those information resources. Therefore, the inclusion of these items should be seen in this light, as these aspects might indirectly or directly influence and determine the differences among libraries involved in this study. All 18 libraries responded to these items of the questionnaire as Table 2 indicates.

**TABLE 2: Nature of libraries**

N=18

<u>Nature of library</u>	<u>Frequencies of responses</u>	<u>Related percentage</u>
- Educational / Academic	13	72.22%
- Research	11	61.11%
- Agricultural	2	11.11%
- Environmental	2	11.11%
- Financial	1	5.55%
- Any other (Medical)	1	5.55%
Total:	30	

Table 2 reveals that only one library appears in the any other category in terms of field coverage that is medical, accounting for 5.55%. In addition, it should be noted that some libraries serve more than one purpose and therefore appear in more than one category of field coverage. All the 18 libraries are well spread out, combining research with either educational or academic functions. The combination of various functions dictated or influenced by the nature of library, helped also to define the various categories of users served and services offered. The frequency of responses is 30, more than the total number of libraries that is 18, because as mentioned earlier several libraries combined different roles. For example, a library could be academic (educational) and at the same time research, agricultural or environmental.

In this case, such a library would be counted in all the categories it indicated.

Greater responses on the nature of libraries came from educational or academic comprising 72.22%, followed by research with 61.11%, agricultural, and environmental each with 11.11%. Finally, financial and medical libraries had 5.55% respectively. With few exceptions, the 18 libraries are research-based, in addition to their other functions, as reflected by the various fields of specialization covered by them.

#### 4.2.2 Number of registered users

Libraries were also requested to indicate the total numbers of registered users they served. This information was important on the assumption that the volume, varieties of users and the level of complexity of users' information needs can give some indication on the nature and extent of the resources (including information technology) a library should have at its disposal. The same factors could also determine how pro-active such a library is in ensuring that adequate and appropriate resources are acquired through a variety of methods to meet clients' information needs. The role of users as determinants of the resources a library needs to have, is therefore critical. These kinds of data include the variety and volume of users each library handles in its provision of information services. In order to arrive at meaningful information from the data submitted by libraries, figures of users were grouped into four ranges as summarized in Table 3.

**TABLE 3: Numbers of registered users**

<u>Users (in ranges)</u>	<u>Number of libraries</u>	<u>Related percentage</u>
Less than 100	6	33.33%
101 - 500	7	38.89%
501 - 1000	2	11.11%
More than 1000+	3	16.67%
	Total: 18	100 %



From Table 3 it is evident that the majority of libraries served more than 100 registered users. These comprised a total of 12 libraries making up 66.67% of all libraries in the study. Only two libraries representing 11.11% had between 500 and 1000 registered users. Only three libraries accounting for 16.67% of the total population surveyed, had more than 1000 registered users. Relating numbers of clients to the nature of the library, as discussed above, the variations in the number of total registered users among these libraries can be attributed to the following explanations or factors.

Firstly, the nature of the libraries themselves. Some of them specialize in more than one field of study and / or research in terms of information coverage, hence attracting a variety of users from several fields of study and / or research. For example, as seen above some academic libraries are also research libraries.

The second explanation relates to the scarcity of research facilities such as, well-resourced libraries and documentation centres in the country and the subsequent concentration of the same facilities in very few tertiary (educational) and / or research-based organizations and institutions. In Tanzania and indeed other developing countries, facilities for obtaining information for research are generally few, normally concentrated in either tertiary institutions and /or research-based parastatal organizations. These institutions have to accept the obligation of providing information services to all researchers in the country who call upon them for specific information, provided proper individual user identification is made. This obligation may be formally designated or *de facto*. From Table 3 above for example, libraries which specialized in only one field of study and / or research, such as medicine or agriculture, and concentrated on providing information needed by researchers, tended to have smaller numbers of registered users than those libraries that specialized in more than one field, hence attracting more and varied library users.

The combination of several information functions and services by some of the libraries studied also accounted for the differences in the number of registered users each library served. For example, libraries identified as academic or educational combine functions ranging from serving the information needs of the academics and students, to those of

researchers, policy-makers, practitioners, and pure consultants. This is better presented in section 4.2.3 below and relevant Table 4. In other words, such libraries are educational / academic because of their educational and training role, and research-oriented at the same time. Such simultaneous combination of functions in the provision of information services, would always not only attract and reflect large numbers of users, but also a greater variety of users. This was reflected by the three libraries which happened to be university libraries and had more than 1000 registered users.

Finally, the same educational / academic libraries indicated large numbers and varieties of users because they have an additional national role of acting as “National Focal Points”(NFP) for information in specific fields like agriculture; science and technology, social sciences and medicine. As such, they are “*de facto* national libraries” for these fields. They have the responsibility of processing and disseminating information related to these fields to the nation at large.

### **4.2.3 Categories of users**

As observed earlier, the nature of libraries appears to have a greater influence on the categories of users being served by them. Table 4 below indicates this relationship. As in Table 2 whereby educational / academic libraries were the majority under the nature of library category, the same libraries also influence the categories of users by being the majority having to serve several types of users. In Table 4 academics as library users are the majority, representing 88.89% followed by researchers, with 77.78% of the total responses. Students and policy-makers represented 61.11% respectively. Although generally students are the majority in educational / academic training institutions, in this study they are not the majority among library users because very few educational / academic libraries have information technology to be included in the study. Percentages for the category of users were calculated based on the fact that in all cases, totals would equal 18 libraries. In the other category of users represented by 22.22% included, practitioners (Architecture and Medical); farmers; and environmental consultants. In general, all libraries served more than one category of user regardless of the nature of the library. Factors accounting for this scenario

have already been discussed above.

**TABLE 4: Categories of users served by individual libraries**

Library and Abbreviation	Students	Academics	Researchers	Policy-makers	Any other
-University of Dar-es-Salaam library ( UDSM)	Y	Y	Y	Y	X
-Tanzania Industrial Research Development Organization ( TIRDO)	X	Y	Y	X	X
-Commission for Science and Technology (COSTECH)	X	X	Y	Y	X
-University College of Lands & Architectural Studies (UCLAS)	Y	Y	Y	Y	Practitioners (Architecture)
-Institute of Marine Sciences (IMS)	Y	Y	Y	X	X
-Institute of Accountancy , Arusha (IAA)	Y	Y	Y	X	X
-Muhimbili College of Health Sciences (MUCHS)	Y	Y	Y	X	Practitioners (Medical)
-Sokoine University of Agriculture (SUA)	Y	Y	Y	Y	Farmers
-Eastern, Central &Southern Africa Management Institute (ESAMI)	X	Y	Y	Y	X
-Cooperative College Moshi (CCLM)	Y	Y	Y	Y	X
-College of African Wildlife Management, Mwika (CAWMM)	Y	Y	X	Y	X
School of library, Archive and Documentation Studies (SLADS)	X	Y	Y	X	X
-Ministry of Agriculture, H / Quarters ( Min. Agr. H/Q)	Y	Y	X	X	X
Tanzania Gender Network Programme(TGNP)	X	X	Y	Y	X
Rwagarulira Water Resources Institute(RWRI)	X	Y	Y	Y	X
National Environmental Management Council (NEMC)	Y	Y	X	X	Environmental consultants
Economic and Social Research Foundation (ESRF)	Y	Y	X	Y	X
Tanzania Food & Nutrition Centre (TFNC)	X	Y	Y	Y	Y
Total of responses	11 (61.11%)	16 ( 88.89% )	14 ( 77. 78% )	11 ( 61.11%)	4 ( 22.22% )

**Key: Y refers : users are served**

**X refers : users are not served**

## **4.3 Status of information technology in libraries**

This sub-section relates to research question number one namely, to provide a current and precise picture of information technology available in the libraries under study. This affected hardware as well as software in terms of their numbers, types, makes / models or brand and the different versions of software packages.

### **4.3.1 IT hardware: numbers, types and makes or brands available**

Libraries were asked to give information on numbers, types and makes or brands of information technology they have available. This information was necessary because one cannot discuss information technology sustainability effectively if there is no clear information about what really exists within the libraries concerned. To reduce data into manageable form, information on computers, printers, CD-ROM drives, Modems, fax and telephone was separately presented in Table 5. Information on Systems and Applications software packages available was dealt with subsequently in Tables 6 and 7. Accordingly all the 18 libraries responded to the relevant items of the questionnaire. These findings are presented in Table 5.

Findings obtained from the responses indicate noticeable variations not only in the total numbers of computers, printers and other information technology equipment and accessories, but also in types, makes or brands of IT equipment available. Such variations in the information technologies available in libraries influence either negatively or positively the performance capabilities of IT equipment. This automatically affects information functions and activities a library could want to offer to its clients. For example, libraries lacking some types of IT equipment, such as modems or CD-ROM drives cannot at the moment hope to provide information and services such as on-line and computer searching to their clients. Therefore it can be argued that the availability of different types of information technology in a given library determined and reflected the type of information-related functions; services and products that library was capable of generating and dispensing to its clients. Another

finding was that given the disparities in the numbers, types and nature of information technology available, information technology development in all the libraries in general, had never been all-round. In other words, the capacity for each library to possess each and every piece of IT equipment a library wanted, has never been possible, despite donors' involvement and support since the mid-1980s.

**TABLE 5: Information technology hardware in libraries**

Library Abbreviation / (TOTALS)	Computers N = 111	Printers N = 72	CD-ROM Drives N = 14	Modems N = 12	Tele-fax N = 14	Telephone N = 18	CD-ROM Databases N = 18
UDSM	11	8	3	1	a	a	6
TIRDO	10	8	1	1	a	a	1
COSTECH	23	18	1	1	a	a	2
UCLAS	1	1	na	na	a	a	na
IMS	4	2	na	1	a	a	na
IAA	2	2	na	na	a	a	na
MUCHS	4	4	3	2	na	a	3
SUA	8	5	2	1	a	a	2
ESAMI	12	7	na	1	a	a	na
CCLM	4	2	na	1	a	a	na
CAWMM	2	1	na	na	a	a	na
SLADS	1	1	na	na	a	a	na
Min. Agr. H/ Q.	6	2	na	na	a	a	na
TGNP	2	2	na	na	na	a	na
RWRI	1	1	na	na	a	a	na
NEMC	14	4	2	2	a	a	3
ESRF	4	2	na	na	a	a	na
TFNC	2	2	1	1	a	a	1

**Key:** a represents: *available*; na represents: *not available*

It is therefore not surprising to say that if all available computers were to be divided equally among all the 18 libraries, the maximum each would get would be three computers only, while the majority of these libraries are serving the information needs of more than 200 library users each. From the analysed data and information affecting the status of information technology available in each of the libraries, it was possible to identify factors which could help to explain this scenario. These factors have been discussed in detail in Chapter 5 of the study.

## 4.3.2 Systems and applications software packages

### 4.3.2.1 Systems software packages

Determining the status of information technology in libraries also involved obtaining information on the systems and application software packages available in them. The importance of getting information on software packages is that without these two types of software both the operation or booting and use of the computer to perform various information functions is not be possible. Table 6 below thus provides a summary of systems software packages available in libraries. Indicated also by the same Table is the frequency of their availability, which in turn has been converted into percentages to determine how commonly available these packages are.

**TABLE 6: Systems software packages in libraries**

System software package	Availability frequencies	Related percentage
1. MS - DOS vers. 6 - 6.62	18 libraries	100%
2. Windows: vers. 3.1 - 3.11	12 libraries	66.67%
3. Windows '95	9 libraries	50%
4. Unix (Linux ver. 2.1 )	1 library	5.56%
5. PC- DOS ( ver. 6.3 )	1 library	5.56%

From Table 6 it is indicated that the most common computer operating systems software package is MS-DOS accounting for 100%. The only difference is in the versions of the software ranging from 6 to 6.62. In case of Windows, 12 libraries use the software. Like MS-DOS, versions of Windows operating software differed from versions 3.12 to 3.11. Only nine libraries have Windows '95 representing 50% of all libraries. The difference between Windows version 3.1 to 3.11 and Windows '95 is that while the former versions need and depend upon an inherent or "in-built" Disk Operating System (DOS) software package to operate or boot the computer, Windows '95 does not. In other words, Windows '95 is complete in itself as an operating system capable of booting the computer. Other operating systems software packages like UNIX and PC-DOS are not common. These two were available in only one library, each representing 5.56% respectively.

One important finding is that the variations in terms of systems software packages and differences in versions of these software packages are common features within and among libraries. As in the case of varying types, models or makes of computers, this could be one of the limiting or facilitating factors for libraries to exploit fully the capabilities of the information technology they have. Some of the operating systems software packages which are already outdated, for example, limit the performance of some of the application functions a library would wish to undertake. According to data from the libraries, most of the systems software packages were obtained as part of the IT support package from donors. One very encouraging phenomenon, however, is that out of their own budgetary allocations libraries themselves are attempting to up-date their outdated computer operating and applications software packages. This aspect can be seen as part of the effort to sustain the use of the technology, although in a small but encouraging way.

#### **4.3.2.2 Applications software packages**

Table 7 indicates applications software packages identified to be in use among the libraries. Fourteen different applications software packages were identified to be in use although only three brands of these were popular ones. These include Word-Perfect; CDS/ISIS and D-BASE III and IV, accounting for 100%; 94.44% and 83.33% respectively. One very

important finding was that at least every library had basic applications software packages related to word-processing and library management functions. For example, Word-Perfect, CDS/ISIS and D-BASE III and IV are important for these library functions.

**TABLE 7: Applications software packages in libraries**

Name of Applications software	Availability frequencies	Related percentage
1. Word-Perfect, vers. 4.1 - 6.1	18 libraries	100%
2. CDS / ISIS, vers. 3.0 - 3.2	17 libraries	94.44%
3. D-BASE, III and IV	15 libraries	83.33%
4. MS OFFICE, (Word; Excel, ver.2.0)	6 libraries	33.33%
5. Data-Perfect, ver 4.0	4 libraries	22.22%
6. ADOBE (DTP)	3 libraries	16.66%
7. Q & A, ver. 4.0	2 libraries	11.11%
8. ARC - INF.	1 library	5.56%
9. EPI - INF.	1 library	5.56%
10. Harvard Graphics, ver. 5.0	1 library	5.56%
11. IDRISI	1 library	5.56%
12. LOTUS, 1 2 3	1 library	5.56%
13. Novel, ver. 3.11	1 library	5.56%
14. MS Solitaire, ver. 3.1	1 library	5.56%

Another observation which is equally important is that there exists a variety of applications software packages among libraries which could imply they were capable of using the technology to perform varied IT applications functions. These functions included word-processing, in-house database creation and management, mapping, desk-top publishing and office management functions. Some of these functions depended upon whether the relevant applications software package was available in a particular library.



Like systems software packages, applications software packages also revealed the existence of different software versions among libraries. This factor also had an impact on the effective use of the technology in that it could limit or facilitate the performance of various applications functions. Most of the applications software packages were also obtained as part of donor IT support packages to libraries. However, libraries on their part are acquiring new and (up-dating old) applications software packages out of their meagre budgetary allocations to sustain the use of the technology in their libraries.

### **4.3.3 Types of makes or brands: computers; printers and CD-ROM drives**

The status of information technology available in libraries, concerned also the makes or brands of IT equipment. The purpose of this information was firstly, to respond to research question number one. Secondly, the need for this information on types of makes or brands of IT equipment emanated from the assumption that recipients of the technology were in almost all cases not involved in the selection of models, makes or brands of IT equipment. If they were involved they would perhaps have selected brands or makes which could be locally supported in terms of back-up services, spares and repairs. The second assumption was that since recipients were not involved in the selection of IT, donors preferred to acquire IT equipment which they were familiar with and which could satisfy the immediate needs of projects they were supporting at that particular moment. One could argue further that donors therefore were not concerned with whether such technology would continue to provide information services to the recipients even after the end of the donor-supported projects. In other words, the useful life of the technology after the expiry of donor-supported projects was not an issue for donors. Data obtained from the field as presented in Table 8 confirmed the above view that the selection of IT equipment did not involve the recipients, as the selection of IT models, makes or brands depended on each and every donor's preference. As a result, libraries have different models, makes or brands of IT equipment, some of which are less known or almost unknown.

**TABLE 8: Types of computer models, makes or brands in libraries**

Model/ Make / Brand	IBM	Compaq	NCR	Olivetti	Wang	MacIntosh
Frequencies in libraries	14	5	5	5	4	2
Relative percentage	78%	28%	28%	28%	22%	11%

The categorization of models or makes or brands of all IT equipment is based upon how spread-out the different models, makes or brands are among the libraries. It is not based on how many computers of a given model or make or brand a certain library has. This was not possible given that the libraries themselves did not indicate the exact numbers for example, of computers or printers of a given model, make or brand. What was done was just to mention the models or makes or brands available in a given library without indicating the total numbers of each type of IT equipment. A tally of the models, makes or brands of computers indicated the following findings: There is a predominance of IBM computers with the frequency of 14 out of 18 libraries, representing 78% of all the models or makes or brands. Following in that order are Compaq 28%; NCR 28%; Olivetti 28%; Wang 22%; and MacIntosh computers 11%. Other models which have a representation of 5.6% each, are ICL, Toshiba, Canon, and a considerable number of other lesser known machines like Multi-Synch, Krypton, Dell, Eko and Zenith. In total, 15 different computer models, makes or brands were identified in the libraries.

**Printers and CD-ROM drives or players**

Printers and CD-ROM players also revealed the same pattern of varieties of models, makes or brands as for computers. Tables 9 and 10 below summarize the information on printers and CD-ROM equipment available.

**TABLE 9: Types of models or makes of printers**

Models/ Makes / Brands	IBM	BULL	APPLE	HEWLETT PACKARD	EPSON
Frequency in libraries	10	1	1	8	8
Related percentages	55.56%	5.56%	5.56%	44.44%	44.44%

**TABLE 10: Types of models or makes of CD-ROM drives**

Models / makes / Brands	IBM	ICL	HITACHI	SON Y	NEC   EKO
Frequency in libraries	3	3	3	1	1   1
Related percentage	16.67%	16.6%	16.67%	5.56%	5.56%   5.56%

The findings on the models / makes / brands of printers and CD-ROM drives, show that IBM printers were widespread among the 10 libraries, representing 55.56% of all available models or makes. Epson and Hewlett Packard models or makes of printers were second in availability in libraries, with an overall representation of 44.44% for each model or make. Lastly, Bull and Apple models or makes represented only 5.56% each, being available in only one library respectively.

In the case of CD-ROM drives, popular models or makes were represented by IBM, ICL and Hitachi. The frequency of availability in libraries revealed that each of these models are represented by 16.67% available in three of the libraries. Other models represented in one library each included SONY, NEC and EKO, each representing 5.56% of all CD-ROM drives available in libraries. The different models / makes or brands of IT equipment in libraries implied the following findings:

- Any library with more than one of any type of IT equipment (for example computers; printers or CD-ROM drives), had more than one model or make or brand of that equipment. For example, the library abbreviated as TIRDO had computers spread among five different models / makes / brands. These included: IBM, Compaq, Krypton, Dell and Olivetti.

The implications of this were that such a library needed to enter into not less than five different service contracts in order to maintain its computers. In Tanzania, experience has indicated that each back-up service provider prefers to service or repair models or makes of IT equipment its company manufactures. Such arrangement of course drains a lot of resources from libraries.

- Another observation is the whole question of IT compatibility among the models or makes or brands existing within and among the libraries. Since the harmonization of IT equipment standards was still a pronounced problem among various IT manufacturing companies, one could not rule out IT equipment compatibility problems among the libraries studied. Finally, it was discovered that some libraries for example COSTECH and TIRDO libraries, had computers which were already obsolete and therefore incapable of performing some of the application functions. These included some old models or makes of Dell and Krypton computers.

#### **4.3.4 IT acquisitions trend, 1976 -1996: computers and printers**

This sub-section tried to establish the trend in information technology acquisitions among libraries after establishing the status of the technology in the libraries. It also partly provided answers to research questions numbers one and two of the study namely, on the status of IT and on the manner in which it was acquired respectively. Libraries were therefore asked to provide information regarding acquisition of IT equipment between 1976 to 1996. The selection of the period was based on the fact that it was between these years that some of the organizations and libraries began acquiring the technology with the partial lifting of the 1974

government's Parliamentary decree referred to under section 2.3 of this study.

Only computers and printers were involved in this because in any plan for the acquisition of the technology these could be considered as the most basic IT equipment. Information about the IT acquisition trend among libraries was important for this study for several reasons. Firstly, it summarized the status of information technology in libraries, especially in basic IT equipment. Secondly, it indicated specific periods of intense acquisitions within the 20-year period which in turn provided the study with clues as regards reasons or factors for intensified acquisitions within those periods. The implications of this knowledge for this study were that we could establish factors as to why and which donor agencies became more and more involved in supporting libraries in the acquisition of the technology. In other words, answering the question: why donor agencies did not support libraries before 1976 and why particularly in these periods? Table 11 thus, provides the summarized trend of IT acquisitions between 1976 to August, 1996. No categorization of libraries in relation to IT equipment acquisitions was done as few libraries were very specific in indicating exactly what was acquired within a given period. Most of the libraries just indicated the total of items of IT equipment available in their libraries without specific break-downs as to period.

**TABLE 11: Information technology acquisitions trends: 1976 - August, 1996: computers and printers**

Period	Computers	Percentage	Printers	Percentage
1976 - 1980	-	-	-	-
1981 - 1985	5	4.50%	4	5.56%
1986 - 1990*	31	27.93%	20	27.78%
1991 - 1995*	68	61.26%	46	63.89%
Jan - Aug. 1996	7	6.31%	2	2.77%
<b>Total:</b>	<b>111</b>	<b>100%</b>	<b>72%</b>	<b>100%</b>

From Table 11 above, the trend of IT acquisitions among libraries indicates that no computers or printers were acquired between 1976 and 1980. Between 1981 to 1985 five and four computers and printers were acquired by only two out of 18 libraries, representing 4.50% and

5.56% respectively. It was in the (asterisked) two periods, 1986 to 1990\*; and 1991 to 1995\* that a dramatic increase of IT acquisitions is reflected. Between 1986 and 1990, 31 computers and 20 printers were acquired representing 27.93% and 27.78% respectively. In the period 1991 to 1995 IT acquisitions among libraries went up to 68 computers (61.26%) and 46 printers (63.89%), indicating an increase of 33.33% and 36.11% for computers and printers respectively. Table 11 thus provides not only the comparisons of acquisitions between computers and printers, but also among the four five-year periods between 1986 and 1996. Two periods, that is, 1986 to 1990\* and 1991 to 1995\* were of intense IT acquisitions among libraries.

Several factors could be assumed to have led to the dramatic increase in IT acquisitions in those periods. Firstly, the period from the mid-1980s up to mid-1990s experienced an increase in donor agencies' interventions to assist a number of sectors including health, education and particularly libraries (Baker, 1993: 3) This resulted from the cumulative effect of declining economy and therefore resources for social investment on the part of the government. Libraries as other sectors, were thus forced to seek external assistance to supplement their library / information resources to meet the ever-increasing information requirements of students, researchers, and academics. It was not surprising therefore to find that a university or research library was being assisted by several donor agencies at a given moment. This could be better explained by Tables 14 and 15 showing the actual names of donor agencies with respect to libraries being supported.

Secondly, and related to the above, was the belief among donors and libraries alike that the introduction and use of information technology in academic and research libraries could partly arrest the ever-declining library and information resources facing African libraries in particular (Rosenberg, 1996:249). Donor agencies saw the introduction of information technology as one of the means which could effectively try to arrest the general decline of libraries- through getting information from abroad via networks and international databases and through CR-ROM databases, instead of libraries relying on highly priced journals, books and other hard-copy sources. Furthermore, it was assumed that the introduction of information technology could effect networking both locally, and internationally in the future.

This could, at least partially, facilitate some sustainability of African libraries. This belief encouraged donor agencies to increase their support to IT among libraries.

Finally, library managements themselves perceived the introduction of information technology in their libraries as a vital and very important innovation given the changes and appearance of new information media in which information was now beginning to be accessed by the users. In order to avoid under-utilization and encourage effective use of library / information services and retain the confidence and support of users, the acquisition and introduction of information technology was very crucial. As a result, library managements had to do whatever they could, especially seeking external assistance, to obtain information technology for their libraries.

## **4.4 Information technology policies, planning and funding**

This sub-section intended to find out the extent to which both donors as well as recipient libraries contributed to the acquisition and sustainability of information technology. It also intended to provide answers to research questions number two and three of the study namely, how was information technology acquired, who financed seed-money for IT equipment and what and whose policies determined the use of IT in libraries? Issues raised in the questionnaire items, and upon which libraries were requested to provide information, revolved around IT planning and policy formulations, budgeting and funding of the technology. These issues were raised in the study on the assumption that since donors have been the funders of the technology implied also was that their influence on these matters was still prevalent.

### **4.4.1 Sources of IT funding: external (donor) sources**

Seven items of the questionnaire requested libraries to provide information on specific types of information technology with regard to the sources or origins of their acquisition funds.

Review of the literature in this study indicated that international aid / support and donor organizations represented an important source of funding for projects involving the introduction of information technology in developing countries' libraries generally (Schware and Choudhury, 1988: 145). To ascertain the truth of this assertion items requested information on computers, printers, CD-ROM drives, Systems and Applications software packages. Each item of the self-administered questionnaire provided four alternative responses or options for libraries to choose from. An IT equipment or software package could have been acquired by the library with funds originating from: *(a) donor (funds) grants only; (b) library own (budget) funds only; (c) a combination of both donor and library's own funds; and (d) any other source (specify)*. All items as they affected IT equipment were responded to by all the libraries except in situations where a library did not possess the IT equipment being referred to by the specific item of IT equipment. Table 12 below summarized those responses. In Table 12, the level at which each source of funds had been utilized by the libraries in the acquisition of information technology was indicated by percentages derived from the library responses to each source of funds among the total of 18 libraries. In other words, the higher the percentage from a certain source of funds, the more that source was used in the acquisition of a specific IT equipment related to it. Based on the differences in the overall percentages, it was possible to establish the rank order of these sources in terms of frequency of use.

Accordingly, the findings indicate that source *(a)* that is, *funds from donor grants only* was the most used by libraries, with an overall percentage of 49.82%. Then followed source *(c)* *funds from both donors and own library funds*, representing 28.70%, while source *(b)* *funds from library's own funds*, accounted for only 5.56% of all the sources. Only one library (the Institute of Accountancy, Arusha), had used its own funds to purchase a computer, printer, and some software packages. No other sources of funds for IT acquisitions were mentioned by the libraries. It could therefore be concluded that almost all IT equipment available in libraries, was mainly obtained or acquired from funds originating from donor agencies.



Another finding from the analysis is that despite the fact that all libraries (except one) have been donor dependent in the acquisitions of information technology, some of them were making some contributions from their own budgets, albeit small.

**TABLE 12: Sources of IT acquisition funds**

Sources of IT Funds	(a) From donor funds only	(b) From own (library) funds only	(c) From both donor and (own) library funds	(d) Any other sources (Specify)
<b>Computers</b>	12 libraries (66.67%)	1 library (5.56%)	5 libraries (27.78%)	na
<b>Printers</b>	12 libraries (66.67%)	1 library (5.56%)	5 libraries (27.78 %)	na
<b>CD-ROM Drives</b>	6 libraries (33.33 %)	na	2 libraries (11.11%)	na
<b>Systems Software</b>	10 libraries (55.56%)	1 library (5.56%)	7 libraries (38.89%)	na
<b>Applications Software</b>	7 libraries (38.89%)	1 library (5.56%)	10 libraries (55.56%)	na
<b>CD-ROM Databases</b>	5 libraries (27.78%)	na	2 libraries (11.11%)	na
<b>Over-all Average percentage</b>	<b>49.82%</b>	<b>5.56%</b>	<b>28.70%</b>	na
<b>Rating of Funding Sources</b>	<b>1</b>	<b>3</b>	<b>2</b>	na

**Key** na: represents not applicable.

These local or own library contributions were assisting in the subscriptions to some CD-ROM databases, up-grading and buying new software packages and the purchase of IT consumables. Such contributions by libraries implied some commitment and acceptance of the technology as part and parcel of the library resources. It could also imply that there is a possibility for these libraries of exploring other methods of resource-generation to sustain the technology in the future.

#### **4.4.2 Sources of IT funding: local (library's own) sources**

Libraries were requested to provide information on the overall budgeting for library services, including information technology. The importance of this information comes from the understanding that in the present times of scarce and dwindling resources of all kinds, all organizations big or small, and whether service or profit-oriented, realize how better and more effective budgeting can improve their operations towards achieving their intended missions and objectives. In the case of the libraries studied, budgeting becomes indispensable because it is through this process that libraries can obtain the much-needed funds for sustaining their operations and services. Furthermore, it is the only large and dependable local source of funds. Gavin (1985: 50) has emphasized the relationship between budgeting and its role in effecting organizational plans and objectives. He asserts that a budget becomes an important vehicle in the overall planning process because it facilitates the implementation of institutional plans and goals. It is due to this truism that a budget could be identified as the formal expression of the plans and objectives a library intends to achieve, that covers all phases of its operations for a specific period of time like one year. Being an effective tool at any level of management in any organization including libraries, budgeting can assist a library to understand how its plans for achieving intended objectives fit into such an operation, in order to achieve a continually improving operating performance.

Given the importance of budgeting, libraries were requested to give information on whether they operated their services based on effective budgeting. If so, to what extent and at what levels of funding did libraries approximately budget for and allocate funds for various activities and functions, staff remuneration, books and journal acquisitions, human resources development and information technology. Table 13 indicates the approximate levels of budgetary allocations to various library areas including information technology.

All libraries responded positively that they normally drew up annual budgets. However, four of them comprising 22.22% responded with a qualified "Yes". The reason for this was that while they perceived budgeting to be a worthwhile exercise, it did not always guarantee that they would automatically receive and spend the actual funds on library services as budgeted

for. In some instances, it was the parent organization management of the library who had more say on how much the library could spend and not the library management which drew up the budget. This was identified as one of the stumbling blocks facing library managements in their attempt to improve and sustain library services. In some institutions parent organization managements had the power to switch part of actual library funds to non-library spending within the institution.

**TABLE 13: Approximate annual budgetary allocations in library**

**N=18**

<b>Area of budgetary allocation</b>	<b>Percentage allocated</b>	<b>Ranking</b>
a) Staff remuneration	52.67%	1
b) Book and journal acquisitions	30%	2
c) Human resources development	6.35%	3
d) Information technology development	4.50%	5
e) Other library / information aspects	6.48%	4

One important finding from the interviews on library budgeting, was that within this structure of authority relationships between the management of the parent organization or institution and that of the library, some libraries perceive the budgeting exercise for their libraries as not being very important. It sometimes does not guarantee the availability of funds budgeted for. Furthermore, the degree to which library managements are allowed to exercise their power of decision-making and therefore the execution of those decisions for the development of the library services was somehow limited. This was particularly indicated by the libraries in relation to decisions affecting the use of library allocated funds, and in case where libraries themselves came up with measures that could ease budgetary constraints. Decisions taken by the library managements on these and other sensitive issues affecting the library had to have the prior blessing of the parent organization managements before they can be implemented by the libraries.

On approximating the levels of funding to the various library areas of activities and functions, only 14 out of 18 libraries responded to the item (Table 13). These represented 77.78% as against 22.22% of the four libraries that did not respond. No reasons were given by the four libraries for the non-response to this item. As Table 13 indicates approximate budgetary allocations to information technology never exceeded the overall average of 4.50% among the 14 libraries that responded. The figure of 4.50% was obtained after computing the average of all estimated budgetary allocations as given by the 14 libraries. One major finding or observation from the estimated budgetary allocations to various library areas particularly on information technology allocations, was that although what is being allocated to IT is still relatively small, libraries are beginning to acknowledge and recognize information technology as an important part of the library resources which has to be supported from institutional and not donor funds. This augurs well for its future development and eventual sustainability.

In this same sub-section of the self-administered questionnaire, libraries were also requested to evaluate the adequacy or otherwise of their annual budgets in relation to their needs. Furthermore, they were requested to provide reasons as to why they considered their budgets to be sufficient or otherwise. In general, 16 of the libraries that is 88.89%, acknowledged that their annual budgetary allocations were insufficient. Only two libraries (11.11%) indicated that they were currently satisfied with their allocations. These two libraries were satisfied with their budgets, firstly because they were newly established research libraries still being cushioned by donor funds in their library acquisitions, including information technology, and secondly, given their infancy, their user population was still relatively too small to put much pressure and demand upon their information services.

The analysis of reasons or factors accounting for the insufficient library budgets was subjected to content analysis method. Sixteen libraries responded to this item of the questionnaire and three categories of reasons were identified. Table 14 below presents those categories, as well as their ranking in terms of the level of seriousness as perceived by the libraries. The calculation of the percentages was based on the probability that each of the 18 libraries could give all the six reasons. Based upon the ranking of reasons or factors, it can be

concluded that libraries perceived the resource-constraints category of reasons as being the most serious for insufficient library budgets.

**TABLE 14: Factors or reasons for insufficient library budgets  
N=18**

Categories of reasons / factors	Frequency of responses	Ranking
<p>A) <b>Resource - related constraints category:</b></p> <p>1. Discrepancies between the requested funds and what is actually given to libraries.</p> <p>2. Unexpected escalations of costs for IT equipment acquisitions; maintenance; and for other library materials and services.</p> <p>3. Ever-increasing and varied user demands for information and services that is, too many competing demands in relation to ever-decreasing library budgets and resources.</p>	<p>16 ( 88.89%)</p> <p>6 ( 33.33%)</p> <p>7 ( 38.89%)</p>	<p>1</p> <p>3</p> <p>2</p>
<p>B) <b>Management - related constraints category:</b></p> <p>4. Lack of up-to-date managerial skills; knowledge and information among library managements on working out effective library plans and budgets.</p> <p>5. Poor commitment by parent organization managements to invest in information as no immediate and tangible returns are either obvious or quantifiable.</p>	<p>3 ( 16.67%)</p> <p>5 ( 27.78%)</p>	<p>6</p> <p>4</p>
<p>C) <b>Policy - related constraints category:</b></p> <p>6. Absence of systematically; well thought- out policies and plans for IT development which in turn hinder mechanisms through which the available resources could be effected or new ones obtained.</p>	<p>4 ( 22.22%)</p>	<p>5</p>

These reasons are ranked one to three with an overall average percentage of 37.96%.

Following are the combined reasons related to both management and policy-related categories representing overall average of 7.41% and 3.70% respectively. However, it should be reiterated that no single reason or factor could on its own account for the insufficient library budgets. It is therefore a combination of more than one factors accounting for this scenario among libraries.

### **4.4.3 Donor agencies supporting IT among libraries**

It was established earlier in this study that donors were the major source of funds for IT acquisitions by libraries. Libraries were therefore asked to give the actual names of donor agencies which were the sources of IT acquisition funds. The importance of this information draws from the previous sub-section of this study on the sources of IT funding. Besides, understanding the types of sources of funds used in the acquisition of IT, it was also necessary to identify the actual donor agencies which assisted libraries. The same information responded also to research question number two of the study namely, the manner in which IT was acquired and who actually provided the seed-money for IT acquisitions.

While Table 15 provides the total number of libraries assisted by each of the donor agencies, Table 16 identifies actual names donor organizations which had assisted each of the libraries as indicated by the libraries themselves. The coding and analysis of the responses involving counting how many times a certain donor agency was mentioned by the libraries, revealed a mix of 32 different donor organizations to have supported IT acquisitions among libraries between 1986 to 1996. However in almost all cases, no distinction was made by the libraries to indicate specifically which donor gave what IT equipment. From Tables 15 and 16 it was noted that most of the libraries, that is 12, or 66.67%, had more than one donor at one particular moment. Each of the donor agencies supplied either IT equipment or funds to one or more libraries without knowledge of other donors assisting the same library. For example, the library of the University of Dar-es-Salaam in this study, had five donor-supported projects each of which included IT support as an item in the whole donor supported project packages. From the analysis it was therefore not possible to establish any structure or pattern in which donor support could be explained. One donor could provide a specific IT item and / or funds to the libraries. Even this differed from time to time in one library or more libraries.

**TABLE 15: Donor support in terms of the number of libraries**

Donor Organizations	Number of libraries assisted
- SAREC / SIDA (Sweden)	Assisted five libraries
- FAO; IDRC; UNDP.	Each assisted four libraries
- NORAD; World Bank; Ford Foundation; Carnegie Foundation; SIDA(Sweden); SIDA (Swiss); UNIDO; John Hopkins University.	Each assisted two libraries
- OTHER 17 different Donor organizations	Each assisted one library

**TABLE 16: Donor organizations and libraries supported**

Name of Library	Donor Agency / Organization identified
-University of Dar-es-Salaam (main) library, (UDSM)	SIDA / SAREC; GEF / FAO / UNDP Bio-Diversity project; Bergen University, (NUFU); Carnegie Corporation / Ford Foundation / American Association for the Advancement of Science; International Development Research Centre, (IDRC) -Canada.
-Tanzania Industrial Research and Development Organization, (TIRDO)	UNIDO; IDRC-Canada; UNESCO
-Tanzania Commission for Science and Technology (COSTECH)	UNESCO; NORAD; IDRC-Canada; SAREC; NCR (Tanzania); UNIDO.
-University College of Lands & Architectural Studies (UCLAS)	DANIDA.
-Institute of Marine Sciences, Zanzibar (IMS)	SAREC; Belgium Government; International Oceanographic Commission, (IOC's RECOSCIX-WIO project)
-Institute of Accountancy, Arusha, (IAA)	UNESCO; World Bank's (FILMVP project)
-Muhimbili University College of Health Sciences, (MUCHS)	SIDA / SAREC; American Association for the Advancement of Science,(AAAS); The John Hopkins University (US); Dreyfus Health Foundation of New York; Medical Exchange International (MEI- US).
-Sokoine University of Agriculture (SUA)	SIDA / SAREC; CTA / ISNAR; NORAD; FAO; IFAD.
-Eastern, Central & Southern African Management Institute (ESAMI)	UNDP; IDRC; SIDA (Swiss); ODA (UK); UNESCO; GTZ (Germany)
-Cooperative College, Moshi (CCLM)	IDRC- Canada.
-College of African Wildlife Management , Mweka (CAWMM)	World Wide Fund for Nature (WWF)
-School of library, Archive & Doc. Studies (SLADS)	British Council; UNESCO.
-Ministry of Agriculture, Head Quarters (Min. Agr. H/ Q)	DANIDA; World Bank; FAO.
-Tanzania Gender Networking Programme (TGNP)	Humanistic Institute for Cooperation with Developing countries, (HIVOS); SNV - Netherlands; SIDA-Swiss
-Rwegarulira Water Resources Institute (RWRI)	DANIDA; UNESCO.
-National Environmental Management Council (NEMC)	Environmental Protection Agency, (APA-US); United Nations Sudano-Saherian Office, (New York); UNEP - GEMS (Nairobi); GEF / FAO / UNDP Bio-Diversity project; ENFO- Ireland.
-Economic and Social Foundation Research, (ESFR)	World Bank; Ford Foundation; African Capacity Building Foundation (ACBF) -Harare.
-Tanzania Food and Nutrition Centre (TFNC)	SAREC / SIDA (Sweden).

#### **4.4.4 Factors influencing donor support to libraries**

Three items of the self-administered questionnaire intended to find factors responsible for donor involvement in supporting libraries, especially in IT, based on the perceptions and experiences of libraries. The assumptions of this study were that, since a large portion of information technology found in libraries was acquired through donors, there was a need to find out from libraries what they thought prompted or encouraged donors to provide such support. Secondly was the assumption that donors do not just happen to assist any library otherwise all libraries in Tanzania for example, would have been supported. There must be underlying factors prompting donors to support a given library and not another. Five randomly arranged factors were provided in the questionnaire item for libraries to choose from. Libraries were at liberty to also indicate other factors which were not listed. Furthermore, they were also required to determine the prominence of each factor in influencing donor support.

All the libraries responded to the item. Only one additional factor not listed in the instrument was mentioned by one library. Table 17 below summarizes these factors and indicates the frequencies of responses for each factor or reason. Based on the total number of libraries that is 18, percentages were worked out in order to rank them according to the level of prominence in influencing donor support to libraries. Based on Table 17, factor (b) that is, in circumstances where libraries themselves took the initiative to work out project proposals and submit them to donors for support was ranked as the most important, representing 83.33% of all reasons. Following, was reason (a) representing 77.78%, that is, where libraries received information technology as part of other donor-supported projects in the libraries. Examples of such collaborative donor-library projects are discussed in chapter 5 section 5.2.1. Ranked third, fourth and fifth are factors (d) with 55.55%; (e) with 11.11%; and (c) and (f) each with 5.56% respectively.



**TABLE 17: Factors influencing donor support to libraries**

Factors or reasons	Total responses	Percentage	Ranking
a) Assistance in IT came to as part of other donor projects implemented by the library	14	77.78%	2
b) The library submits its own project proposals to donors requesting assistance in obtaining IT.	15	83.33%	1
c) Information technology came to the library as an unsolicited gift	1	5.56%	5
d) Donors had projects of their own with an information component whereby the library was requested to cooperate in their projects	10	55.56%	3
e) The library provided premises / accommodation to IT donated to the library's parent organization	2	11.11%	4
<u>Any other factors:</u> f) Some donors are willing to support developing country institutions in anticipation of earning funds in the form of tax rebates and financial contributions from their respective governments	1	5.56%	5

## 4.5 Information technology policies on selection and use

### 4.5.1 IT selection and use procedure in libraries

To provide answers to research question number three of the study namely, what and whose policies were determining the use of available information technology, libraries were required to indicate whether they had policies affecting the selection and use of information technology. In case the response was negative, they were also requested to explain how the absence of policies affected IT selection as well as use in the libraries. Furthermore, in the case of donor-library relationships, libraries were to identify who determined which functions or activities the available technology was to be used. The assumption by this study was that if libraries had policies on IT selection and use, they could guide the effective and rational use of the technology. Properly worked out policies in relation to a given activity could normally lead to better planning and therefore give an organization a sense of direction towards

achieving the intended objectives. Furthermore policies on IT within the library environment could assist libraries in the systematic identification of user needs and priority areas for IT's development that would respond to those needs. Finally, they could act as bases for internal monitoring, reviewing and evaluation of what libraries would be using the technology for. Based upon these assumptions, information on IT policies was thus requested from libraries.

Analysis of the responses on whether libraries had policies on IT selection and use indicated the following. Only four libraries representing 22.22% had some form of policy on IT selection and use as against 14, that is 77.78%, which had no policy whatsoever. The absence of policies on IT selection and use was affected by the fact that among most of the libraries, the technology itself was still a recent acquisition. As such it was in the early stages of being integrated as part and parcel of the normal library / information services. Secondly in some way, foreign funding through donors, was also partly responsible for the absence of IT policies in libraries. In most cases, donors themselves had taken the initiative of selecting IT equipment on behalf of recipient libraries. Donors did this because they were more technically knowledgeable and had experience with the technology. In addition, donors also had more of the required resources in the processes of IT selection and acquisition than the libraries.

Absence of IT policies on its selection and use among most of the libraries, has had great impact on the library decision-making processes. This has affected the decision-making processes of libraries in that important decisions affecting the selection and use of the technology are either being based on common sense or on the current and potential use of the technology. Furthermore, such decisions are also dependent on opinions given by external sources, especially by donors. As a result, library managements are becoming more and more dependent on donors in decisions affecting information technology selection and sometimes its use in libraries.

In order to find out who decided or determined for what functions and activities the available technology was being used, libraries were provided with four alternative options to choose from. These included: (a) *library management only*; (b) *donors of information technology to*

libraries; (c) both library managements and donors of the technology; and (d) any other (specify). Table 18 below summarizes the perceptions of libraries on the decision-making processes in relation to determining IT functions and activities in libraries. Findings on decision-making processes for determining IT functions and activities, indicated that both donors of the technology and recipient library managements were jointly responsible for making decisions on IT functions and activities. This is represented by 61.11% of all possible decision-makers. However, within this set-up of decision-making between the donors and library managements, it was not possible to establish the degree to which the latter were entitled to decision-making. What could be said here is that since recipient libraries lack policies on IT, donors' influence in matters affecting IT in libraries is still prevalent.

**TABLE 18: Decision-makers on IT functions in libraries**

Decision-Makers:	Responses	Percentage	Ranking
(a) Library managements only	7	38.89%	2
(b) Donors of IT to libraries only	1	5.56%	4
(c) Both (a) and (b) together	11	61.11%	1
(d) Any others (specify)	2	11.11%	3

According to Table 18, only in seven libraries representing 38.89% were library managements able to make decisions on IT use without much donor influence. In the “any other” category, two libraries, that is 11.11%, indicated that in some instances, library committees and the parent organization managements make decisions on IT use in libraries. In general it could therefore be argued that although library perceptions indicated that some freedom existed for library managements to make decisions affecting IT use, the prevalence of donor influence upon library management decisions-making processes cannot be ruled out.

Despite this fact about donor influence, all the libraries were in agreement on the ways or methods they used in order to determine the selection of information technology, its subsequent use, and the assessment of user IT-related information needs, services and

products. These methods could be categorized into two areas: those initiated by the library - **library-initiated methods** and those resulting from the user - **user-based methods**. These methods as identified by the libraries, included the following:

- Researching and assessing user IT needs through survey questionnaires; user evaluative studies, tailor-made user education sessions and liaising with and analyzing user requests.
- Use of participative styles of management, through user representation in library committees and meetings, library staff attending user events, seminars and workshops.
- Exploiting the knowledge and experiences of other local and foreign libraries offering IT-related information services.
- Marketing and promoting IT-related services through exploiting formal and informal information dissemination channels and use of promotional materials.
- Enlisting support from IT experts, donors and IT vendors.
- Use of publishers and IT manufacturer catalogues and brochures.

#### **4.5.2 Functions or activities for which IT was used**

Information was requested from libraries to identify functions and activities for which information technology was used. This information responded to research questions three and partly four on IT use and problems affecting its use respectively. One of the observations was that given the variations in terms of available technology in libraries also affected negatively the type of functions or activities library performed. These functions were also affected by the type of IT knowledge and skills libraries had. This information in turn assisted this study to identify IT areas where training was needed by the libraries. Libraries were given a list of IT functions from which they could indicate those that they were doing, and any other functions that were not listed in the questionnaire. The analysis of the responses indicated that in general word-processing was common to all libraries, representing 100%. Then followed in-

house database creation and management, performed in 16 libraries (88.89%). Other functions included: literature searches with 61.11%; on-line communication and document delivery, 50%; union listing of periodicals, 33.33%; desk-top publishing, 22.22%; networking 22.22% and some library house-keeping functions represented 11.11%. One very important finding affecting the IT functions was that the use of information technology in most of libraries studied, was still restricted within the library environment and as such, it had never gone beyond the elementary stages to more advanced uses of the technology like management Information systems (MIS) or Internet connectivity.

### **4.5.3 IT skills, knowledge, competence and training needs**

To provide information to answer research questions three and four of the study, libraries were asked to assess the level of IT skills, knowledge and competence of their library staff members. Three alternative options were given: (a) *adequate*; (b) *inadequate*; and (c) *do not know*. In addition, they were also requested to identify IT areas where they thought training was needed.

All the 18 libraries responded to this item of the self-administered questionnaire. Of the 18 libraries, only seven, representing 38.89%, indicated an adequate satisfaction, while 11 libraries (61.11%) rated their staff members as being inadequate in having IT skills and knowledge required in relation to the use of the technology. One very interesting finding however, was that even the seven libraries that indicated that they were satisfied with the level of IT skills and knowledge of their staff members nevertheless indicated areas of IT in which training was needed. This implied that generally all the libraries involved in the study were deficient in one or more fields in terms of IT skills, knowledge and competence. Table 19 below thus summarizes the broad categories of IT areas where training and education were needed.

**TABLE 19: Broad categories of IT training needs**

Categories of IT training needs	Responses	Percentage	Ranking
1) Diagnostic; trouble shooting; maintenance and implementation of IT and IT systems.	3	16.67%	7
2) Database design; management and administration	7	38.99%	4
3) Desk-Top publishing and generation of various reports	4	22.22%	6
4) Electronic communication: on-line literature search; E-Mailing, Net-working and Internet connectivity	11	61.11%	2
5) Library / information house-keeping functions; information retrieval; packaging; repackaging and dissemination	12	66.67%	1
6. Practical programming, including systems analysis	8	44.44%	3
7. Specialized training in specific soft ware packages on: applications; spread sheets; statistics; graphics.	5	27.78%	5
8) Training in principles and theories governing IT management; specifically on planning; training of trainers.	3	16.67%	7

Despite the fact that the ranking of training areas differ among libraries, one commonality is that there are great training needs in all of them.

## **4.6 Sustainability of information technology in libraries**

### **4.6.1 Feasibility: problems and strategies**

This sub-section intended to provide answers to research questions four and five of the study, namely bottlenecks affecting the use and sustainability of IT and whether or not IT sustainability was feasible, and if so what could be the strategies to effect it. Libraries were to determine whether IT sustainability was feasible or not. Under this item two alternative options of “yes” and “no” were given to choose from and also to indicate reasons for the choice of either of these. Out of 18 libraries, the majority (13, representing 72.22%) indicated that IT sustainability was feasible provided several factors or conditions were met. The factors or conditions referred to are the strategies which have been identified by the libraries

themselves and those provided in the research questionnaire, requiring libraries to rate them according to their importance in terms of effectiveness in achieving IT sustainability. Three libraries (16.67%) responded negatively, citing funding constraints as the major hindrance towards IT sustainability. Two libraries (11.11%) were undecided on the issue, and no reasons were given for this.

#### **4.6.2 Identification of IT sustainability strategies in libraries**

Given that the majority of libraries in this study responded positively that IT sustainability was feasible, they were therefore requested to identify strategies which they thought could facilitate it in the library environment. The intention of including this item in the self-administered questionnaire was to provoke thinking on constructive ideas on the part of the libraries. This could result in concrete, potential and feasible proposals towards effective solutions to the problem of IT sustainability. The analysis of the responses indicated that the proposed strategies towards IT sustainability could be conceived within three broad categories namely,

- a) **Resource-related strategies:**  
that is, those strategies affecting or concerned with the generation of adequate resources of all kinds human, fiscal and physical.
  
- b) **Policy, planning and management-related strategies:**  
namely, those strategies concerned with policy formulations; planning and management of the technology.
  
- c) **Information as a resource-related strategy:**  
includes those strategies concerned with how the role and value of information as a resource could be enhanced for its effective recognition and therefore its adequate support.

Table 20 presents a summary of these strategies based upon the frequencies of scores for each identified strategy. Corresponding percentages were calculated based on the total possible of 18.

**TABLE 20: Proposed strategies for achieving IT sustainability in libraries**

Categories of Sustainability Strategies	Responses	Percentage
<b>A) <u>RESOURCE-RELATED STRATEGIES:</u></b>		
1) Explore and institute varied sources of funding for information services.	4	22.22%
2) Introduce fee-based services at market value; and cost recovery mechanisms to some library / information facilities; services and products.	11	61.11%
3) Explore and embark on entrepreneurial ventures that could generate income for the library, such as commissioned research; consultancies creation of local databases; fund raising and IT training programmes.	6	33.33%
4) Commit government to provide more resources as part of its obligation to the development of the information sector.	8	44.44%
5) Re-allocate; change priorities; and rationalize the utilization of resources for example, replace journals with databases and on-line document delivery; typewriters with printers.	5	27.78%
6) Establish an IT amortization fund for priority information services and products.	4	22.22%
7) Work-out resource-sharing measures through establishing an association of libraries with information technology in order to share most of the scarce IT resources in training; technology; expertise; services and maintenance.	7	38.89%
8) Create an internal IT skills base through training and continuous education and retain skilled and trained staff through proper and competitive remunerative packages.	9	50.00%
<b>B) <u>POLICY / PLANNING / MANAGEMENT- RELATED STRATEGIES:</u></b>		
9) Formulate library / information policies and plans which conceive of information technology as an integral part of the normal and accepted library / information services.	6	33.33%
10) Include information technology and related services as a line-item in every annual budget and projects to facilitate its over-all development.	8	44.44%
11) Establish twinning arrangements with interested local and external organizations which can assist local efforts in library sustainability.	3	16.67%
12) Coordinate and direct local as well as external support to library / information services and projects already in existence instead of establishing new ones.	2	11.11%
13) Library managements should be more pro-active in influencing decision on donors SO that projects established in libraries are compatible with local priorities; include sustainability mechanisms; and can later be sustained within the resources that could be available locally.	4	22.22%
<b>C) <u>INFORMATION AS A RESOURCE - RELATED STRATEGY:</u></b>		
14) Create a general awareness of the value and role of information as a resource so that it is supported.	4	22.22%
15) Sensitize management and other key decision-makers that influence resource allocation and priority setting in the institution.	9	50.00%
16) Infuse acumen and innovativeness among library staff to offer quality information services and products which can convince management decision-makers and users on their indispensability.	2	11.11%
17) Promote the marketing of information and IT services and products in order to create demand, and thus build a dependable and supportive user-base capable of justifying continued funding and support of the information services.	5	27.78%



### **4.6.3 Problems and solutions of IT sustainability**

In response to research question four namely, what were the bottlenecks in the use and sustainability of information technology, and how they were being, or would be solved, libraries were requested to identify these problems. Furthermore, they were also required to suggest ways in which they could be solved. The assumption here was that identification of problems was the first step towards seeking their solutions. All the 18 libraries responded and several problems as they affect the use and sustainability of IT were identified. The analysis of the responses indicated that the problems could be categorized in three areas.

Firstly there were the problems resulting from the technology itself, that is, technology-related problems. Secondly, there were problems caused by the scarcity of resources of all kind, that is, resources-related problems. Finally, there were problems related to the limited capacity of libraries themselves to plan and manage effectively the technology. In other words, problems emanating from the limited capacity and opportunity for library managements to make independent decisions affecting the library in an environment where there are other more powerful players or decision-makers. These include, for example, donors of the technology and library parent organization managements. Table 21 below presents the problems in their three identified categories.

**TABLE 21: Problems affecting IT use and sustainability in libraries**

CATEGORIES OF PROBLEMS	Frequencies of Responses	Percentage	Rating of Problems
<b>A) <u>TECHNOLOGY-RELATED PROBLEMS:</u></b>			
1) Incompatibility of some hardware and software resulting from non-standardization of information technology.	3 libraries	16.67%	6
2) Low performance capabilities of some IT equipment as some of the donated equipment was not the state of the art, or had passed its useful life.	5 libraries	27.78%	5
3) Maintenance, up-dating and servicing problems resulting from limited IT knowledge of library staff in trouble-shooting and identification; and limited back-up services to some of the IT models or brands.	16 libraries	88.89%	2
4) Shortages of all types of, and in both quantity and quality of IT hardware and software. There is too little of IT equipment and software to carry out all the IT-related information functions libraries would have liked. In other words, most of the libraries are not well endowed with adequate and appropriate IT and IT connectivity.	18 libraries	100%	1
<b>B) <u>RESOURCE-RELATED PROBLEMS:</u></b>			
5) Overall insufficiency of funding which affects all areas of IT development for example, maintenance; consumables and spare-parts. In some way IT is seen as an additional cost burden to already burdened libraries due to poor funding.	16 libraries	88.89%	2
6) Low levels of IT skills and knowledge and competence which impacts on the technology.	12 libraries	66.67%	3
7) Lack of in-country IT training opportunities and limited availability of training programmes at advanced levels.	7 libraries	38.89%	4
8) Retention of IT trained and skilled library staff is also a challenge to libraries due to limited remuneration packages which are incomparable with those in the private sector.	3 libraries	16.67%	6
<b>C) <u>LIMITED CAPACITY IN DECISION-MAKING PROCESSES:</u></b>			
9) In some of the critical situations, library managements lack discretionary powers of making decisions or carrying out certain important measures on sensitive library issues which may be affecting management of libraries, unless those decisions or measures have the prior blessing of their superiors. In other words, library managements are sometimes forced to decide on issues affecting their libraries within the confines of or limits laid down by their superiors or in some cases, the donors.	2 libraries	11.11%	8
10) Library managements lack knowledge and experience on how library projects with IT components could be sustained within the local environment. This affects the making of effective decisions towards workable strategies for IT sustainability.	1 library	5.56%	9

These two categories of solutions to problems affecting IT sustainability draw on information from Tables 20 in the preceding section and Table 21 in this section. These solutions result from the responses received from the libraries and subjected to content analysis and later rated.

### **Category A: Resource and technology-related solutions**

Solutions proposed under these categories of problems included those which in general could help the libraries to generate adequate resources of all types needed. The idea of using those resources effectively and rationally is also proposed. The practical strategies suggested under this category included that libraries should:

- ensure that they attain their own guaranteed resource support through a variety of methods, such as cost recovery and cost-sharing mechanisms,
- solicit both local and external assistance,
- enlist support through provision of effective and need-based information services,
- develop markets for services and products generated by the technology,
- balance library budgets by trimming operating expenditures, less essential services and unnecessary overhead costs.

Other proposals related to:

- sharing of resources with other interested information centres and organizations,
- establishing twinning programmes locally and internationally,
- involving the private sector (for example, industries, foundations, alumni and other private organizations) which could use information services at a cost or those that were willing to assist libraries.

- Acquiring managerial, technical, and effective IT usage expertise through training and education is also emphasized.

### **Category B: Policy-management -related solutions**

Under this category of problems, the solutions proposed include those that would provide answers to problems resulting from policy formulations, planning and management aspects. Basically, all the solutions intend to facilitate effective library / information support by the top managements to which libraries are answerable. Proposed solutions included therefore:

- the need for raising the value and importance of information among users and management alike. In other words, library managements should establish an entrenched system of creating awareness and influencing policy-makers both at institutional and national levels, on the value of information and the importance of investing adequately in it. This was crucial because the sustainability of libraries and information technology in particular, will ultimately depend on the overall value and contribution of information to the development and achievement of institutional objectives.
- The need to equip library managements with modern managerial and information / library management techniques through training was proposed by some libraries. This according to them could raise the level of knowledge of library managers on the current principles and theories towards effective information and information technology management in libraries.

One very important observation among the identified problems and related solutions to problems affecting IT sustainability is that the problems are mostly related to the sustainability strategies that this study has identified, and include most of the issues raised by the review of literature.

#### **4.6.4 Basic conditions or requirements for IT sustainability**

Basic conditions or requirements for effecting the sustainability of information technology responded to research question number five of the study, namely, what strategies were or could be put in place by the libraries in effecting the sustainability of information technology

for its long term use. The inclusion of this item was also to make libraries aware of what could be expected of them to implement to effect IT sustainability. These were randomly listed in the self-administered questionnaire. In order to gauge the perceptions of libraries on the level of the importance or effectiveness they could attach to each of the 13 conditions, they were requested to rate them from **one** (as being the **most important**) to **13** (as being the **least important**) (Table 22).

If a condition scored the minimum of 18 points, then it would have been scored as number one by each of the libraries, and would be considered to be the most important condition. In other words, the lower the total number of score points a condition gets, the lower the percentage of that condition and therefore, the more important it is in effecting IT sustainability. If a condition is scored above **18** points onwards to the total highest score of 234, then its importance in the rating would decrease with the increase in the scores and the percentage of that condition. Table 22 reflects the perceptions of libraries on the level of importance libraries attach to each of the conditions in effecting IT sustainability.

The rating of the conditions or requirements for sustainability was based upon the differences in percentages which in turn were calculated on the scores each obtained. Since there was an inherent logical value order among the conditions, that is, their level of importance in effecting IT sustainability, a logical ranking level of measurement that is *ordinal* was used. Based on the perception of libraries and the resulting rating , the most important condition for IT sustainability namely, *support from parent organization* obtained 16.24%. The least important condition which is *minimizing dependence on donors* has 84.62%. It is within these two extremes of percentages that other conditions or requirements for IT sustainability fall. Although the rating of conditions gives a picture of what libraries perceived was the importance of each condition, it should be emphasized that no one condition or requirement however important it might be, can independently effect or bring about IT sustainability. It is the view of this study that all conditions are mutually interdependent and therefore would require concurrent implementation if IT sustainability is to be achieved. No conditions were explained by the libraries.

**TABLE 22: Basic conditions or requirements for IT sustainability**

Conditions or requirements	Score and related percentage	Rating per importance
- Support from parent organization	38 16.24%	1
- Mobilization and optimum use of resources	71 30.34%	2
- Having financial sustainability	89 38.03%	3
- IT human resources development	98 41.88%	4
- Knowledge of users, their needs and tailoring information services to those needs	102 43.54%	5
- Enhancing the value of information	105 44.87%	6
- Adoption of enabling IT policies	107 45.73%	7
- Promotion and marketing of IT services and products	107 45.73%	7
- Application of good management skills and practice	108 46.15%	9
- Support from users	125 53.42%	10
- Generating income and effecting cost recovery/ sharing measures	143 61.11%	11
- Undertaking resource-sharing measures, locally, nationally and internationally	171 73.08%	12
- Minimizing dependence on donors	198 84.62%	13

#### 4.6.5 General comments on IT sustainability

The last items of the questionnaire as well as the interview schedule canvassed general views or comments from libraries on the overall issue of IT sustainability in library environments. Almost all the comments given concerned proposals on what libraries could do to alleviate or solve the problem. From the views given one gets the impression that to some extent libraries were already aware of the problem and potentially at least, had very constructive ideas, although many of them were yet to be implemented to test their feasibility. The following are the general comments inferred from library responses.

- i The need for cooperation among libraries having the technology was an issue of much concern to all libraries. It was proposed that this could be done through:

- the creation of consortiums, inter-library networks, and the identification of few designated libraries which could become “centres of excellence” responsible for offering IT related services and products to other libraries or institutions with which they share common missions and objectives. This could imply the rational use of the resources, encourage resource sharing and experience and joint acquisitions, especially of expensive information resources like IT; databases and journal subscriptions. Cooperation rather than competition among libraries was highly emphasized by ten of them .
  
- ii The need to enhance the role and value of information so that it attains its rightful place in the institutional as well as national development process. The assumption here was that the low role and value of information contributed to its under-funding which in turn affected the sustainability of information systems in general.
  
- iii While dependence on government for funding information services would continue, libraries emphasized the need for being pro-active in exploring alternative and diversified sources of funding for information services.
  
- iv The need for working out IT policies which could facilitate effective planning and investment towards sustainable IT development in the libraries concerned was also commented upon.
  
- v While support from donors was not ruled out for the time being, libraries were more concerned with how to make such support work more effectively so that it can assist them attain their own sustainability without replicating the vicious cycle of continued dependence on donors. Some comments about effecting this propose that library managements should begin coordinating donor support in their libraries so that it is directed to areas of greatest need. In other words, donors should be convinced by the recipients to assist projects which already exist in the libraries or new ones which the libraries themselves have identified, based on the greatest needs.

## 4.7 Summary

This chapter has dealt with the analysis and presentation of research results based upon the data and information obtained from the libraries. In accordance with the research questions set for this study, this sub-section presents the summary of the major research findings resulting from the analysis:

1. In general the status of information technology in the libraries studied, was still at the initial stages of its development, despite donors, involvement over quite some time. As such, all-round IT infrastructures have not yet fully developed. What could be seen are the patchy initial stages or attempts to introduce the technology, whereby full IT acquisitions have yet to take place.
2. Among all the libraries and within each library there exist great variations and discrepancies in terms of information technology equipment and related accessories, resulting in the unequal distribution of the available technology among libraries.
3. As a result of (1) and (2) above, very low levels of IT connectivity are found in libraries due to lack of other important and basic IT accessories.
4. The funding and subsequent acquisitions of information technology for the libraries emanated from the donors. In most cases, IT was donated as part (or adjunct) of other major donor-assisted information projects to the libraries, resulting from project proposals written and submitted by libraries to donors for assistance or support.
5. While donor funding has been (and is still) very influential in IT acquisitions, all libraries (except one) were obtaining support from more than one donor agency or organization. The minimum number of donor agencies assisting a particular library at one particular moment has been between two and five.
6. There is acceptance and recognition of the potential of IT among libraries, hence some budgetary allocations for IT are beginning to be made, although still comparatively small in relation to other library resources like, book and journal acquisitions and human resources development.



7. Generally the majority of libraries studied have no policies whatsoever to guide the selection, use and overall development of information technology.
8. Despite the fact that some freedom existed for library managements to make decisions affecting the use of the technology, the influence of donors on these issues was still indirectly (and sometimes directly) present.
9. The use of the available technology was still restricted to more basic and common information services. In other words IT use in most of the libraries has not yet involved each and every area of library / information services in libraries themselves, or gone to more advanced uses and applications of the technology, like Internet, World Wide Web (WWW) or local or wide area network (LAN or WAN) connectivity.
10. Generally there is a pronounced shortage of IT skills, knowledge and competence among most of the libraries, implying that there are great training needs as indicated by the IT areas where training was badly needed.
11. The non-availability of some of the basic IT equipment and accessories, limited IT skills, knowledge and competence and hence, restricted use of the technology in most of the libraries, imply that a small level of user IT-related information needs are currently satisfied by these libraries.
12. Problems affecting the generation of adequate resources of all types, (that is, human, fiscal and physical) are the most serious ones affecting all the libraries in the use and sustainability of information technology.
13. On the feasibility of IT sustainability in libraries, there was a general consensus among the majority of them that this could be feasible *only if* responsible libraries put into practice all or most of the strategies proposed, and these have to be acted upon concurrently.
14. An attitude of some apprehension was however indicated as regards IT sustainability, in view of the fact that implementation of some of the strategies was beyond the library's realm of control particularly those that needed other management structures' approval.

15. Since there is a symbiotic relationship between the library as an information system and information technology, the attainment of IT sustainability would only be possible if it encompasses the sustainability of the entire library / information system. This was the only rational and appropriate approach within which IT sustainability could be conceived.

## 4.8 References

- African Regional Centre for Technology (ARCT). 1993. **Carnegie Science and Technology Information (STI) for sustainable development in Sub-Saharan Africa: STI projects.** ( Report of the Carnegie-funded Sub-Saharan Africa STI projects) Dakar: African Regional Centre for Technology.
- Baker, S. 1993. **The survey of information technology in Tanzania.** Dar-es-Salaam : Tanzania Commission for Science and Technology.
- Gavin, T. J. 1985. Beyond survival: library management for the future. In: B. P. Lynch, **Management strategies for libraries.** New York: Neal-Schuman.
- Moahi, K. 1996. Training of African librarians for the new information age: progress in **Botswana.** *Information for development*, vol.12 (2): 91-95.
- Mulira, K. H. 1995. Managing information technology in **Uganda:** strategies and policy formulation. *Information technology for development*, vol.6: 95-105.
- Rosenberg, D. 1992. **National information services and information resource sharing and networking.** Follow-up and evaluation seminar. Nairobi, Kenya. 26th -31st, October. pp.247-251.
- Rosenberg, D. 1996. **University libraries in Africa; a review of their current state and future potential.** London : International African Institute.
- Priestley, C. 1993. **SAREC library support programme; evaluation and review: Ethiopia, Mozambique and Tanzania.** Stockholm: Gotab. (SAREC Documentation series; 1993:1).
- Schware, R and Z. Choudhury. 1988. Aid agencies and information technology development. *Information technology for development*, vol.3 (2): 145-158.
- Stephen, P and S. Hornby. 1996. **Simple statistics for librarians and information professionals.** London: Library Association.

# CHAPTER 5

## DISCUSSION OF RESEARCH RESULTS

### 5.1 Introduction

This chapter interprets and discusses the findings which emerged from the analysis of data and information as presented in Chapter 4. Kerlinger (1973: 17) observed that the analysis of research data and information does not in and of itself provide the answers to the research questions. It is therefore essential to interpret that data and information if the research questions have to be responded to fully and, simultaneously make sense out of what it is that is described. In this chapter the discussion of the results has been based on the five major research questions. It is these questions which in turn reflected the main purpose of the study namely, to investigate the status of information technology and the feasibility for academic and research libraries in Tanzania to attain capacity to sustain the information technology they currently use or that which they may acquire in the future, which is largely acquired through donor assistance. In particular, the study set out to explore or investigate the problem through the following specific research questions:

- i What was the current status of information technology in libraries under study  
with regard to:
  - a) information technology available?
  - b) personnel?
  - c) information services being offered?
- ii How was information technology acquired, who financed seed-money for information technology equipment and for its later acquisition, up-dating, maintenance and general IT sustainability?
- iii What and whose policies were determining the use of available information technology in libraries?

- iv What have been the bottlenecks in the use and sustainability of the IT, and how were those problems being or anticipated to be solved?
- v What strategies were in place or could be put in place in effecting IT sustainability for its long-term use?

In order to obtain the required data and information in response to the research questions identified above, eighteen locally owned and funded academic and research libraries having and using information technology in Tanzania were involved in the study. The criteria for their selection were based on the nature of their ownership, funding mechanisms and the possession and use of information technology in their information functions. The same criteria assisted the study in excluding other libraries which despite the fact that they used information technology, did not meet one or more of these criteria. Excluded libraries included those of foreign embassies, missions, international organizations as well as of secondary and primary schools.

Two main research instruments including, the questionnaire and the interview schedule, were used in gathering the necessary data and information pertaining to answering the research questions. To supplement the main instruments, other methods included reviewing and analysing related literature and IT project documents, and observation of the actual IT situation in the libraries where interviews were carried out. As discussed earlier, the application of the triangulation technique, that is, combining more than one research instrument in data and information gathering, proved to be useful, given the under-researched nature of the problem. The technique facilitated the collection of adequate and hard-to-find data and information on the problem which in turn increased the reliability of that data and hence, the research findings on the problem being investigated ( Line, 1982 : 63)

## **5.2 Answering the research questions**

From the analysis of data and information obtained from the libraries, the following were the research findings in response to each of the above-mentioned research questions.

## 5.2.1 Current status of information technology in libraries

### (a) Hardware, software and IT accessories

To answer the first research question on what information technology equipment and related accessories actually existed in libraries, data and information obtained from the responding libraries were categorized according to aspects of quantity, models / makes or brands of information technology equipment, and the software packages which were identified. It was finally tabulated in Tables 5 to 10 in order to come up with a complete picture or status of the technology. The Tables cover computers, printers, CD-ROM drives, CD-ROM databases, modems, telefax and telephone. Other IT accessories affected were systems and applications software packages including their different versions.

In order to answer the first research question, namely the status of information technology in libraries under study, the following research findings were identified:

- a. The status of information technology in libraries studied, revealed that in terms of the level of acquisitions and general IT development, information technology was perceived to be at the initial stages of being developed, hence not revealing fully developed IT infrastructures in all the libraries.

In other words, what could be seen in most of the libraries, were the patchy initial stages or attempts to introduce the technology despite the involvement and support of donor agencies for quite some time. Tables 5 to 7 provide a summarized picture of what each library has in terms of IT equipment and related accessories. The same tables also reflect the level of discrepancies or differentiation in the technology available among the libraries.

From these Tables it is observed that, more than half of all the libraries, that is eleven libraries or 61.11%, have less than the mean average of six computers while 67% or 12 of them, were expected to serve the information and IT- related needs of from 200 to more than 1000 users of various types and complexity. Taking computers as the basic IT tool, for example, the mean of six computers per library is obtained if the 111 computers available

in all the 18 libraries were to be divided or distributed equally. It should however, be pointed out that the quantity of computers and other IT-related accessories varied greatly from one library to another. Although the average of six computers per library may seem quite favourable, in fact more than half of the libraries studied fell below that. This is because six of the libraries, possessed more than the average, that is between eight and twenty three computers, thus pushing the average up. The six libraries concerned were those of the University of Dar-es-salaam (UDSM), Tanzania Industrial Research and Development Organization (TIRDO), Tanzania Commission for Science and Technology (COSTECH), Sokoine University of Agriculture (SUA), Eastern, Central and Southern African Management Institute (ESAMI) and National Environmental Management Council (NEMC). When the breakdown for computers was analysed for more typical measures it was found that more than half of the libraries that is 12 representing 67%, had between one and four computers each. It is this factor of unequal possession and hence distribution of computers among libraries that the average of computers is positively skewed.

A similar situation affected also other IT-related accessories, like CD-ROM drives, CD-ROM databases, modems, systems and applications software packages. If computers can be taken as a representative example of IT acquisitions and therefore IT possession by each of the libraries, the status of information technology in most of them could be described as generally reflecting a weak, undeveloped and unevenly distributed IT infrastructure. However, in the case of university (academic) libraries, the status of information technology in terms of what is possessed was far better than in many of the research libraries. These libraries are those of the University of Dar-es-Salaam, Sokoine University of Agriculture and Muhimbili University College of Health Sciences.

Through interviews it was revealed that the differences in the amount of information technology available in each of the libraries could be explained by three important factors. Firstly, obtaining IT equipment depended very much on the ability of each library to attract as many donors as possible. If a given library has a library management which is more aggressive than other libraries, in approaching and attracting donors, then the possibility of its having more IT equipment is obvious.

Related to the above, the second explanation for differences in information technology possessed by each of the libraries, is the fact that some donor agencies collaborate with some Tanzanian academic and research institutions in joint research programmes in which both parties have an interest. Through such collaborative research projects some institutional libraries benefit from the situation by obtaining the technology. Some examples are the collaborative research programmes since 1985 between the Swedish Agency for Research Cooperation with Developing Countries (SAREC-Sweden) and at least six Tanzanian academic and research institutions. As a result of these, six Tanzanian academic and research libraries benefited by obtaining information technology equipment and accessories. Other examples are:

- i Carnegie-funded Scientific and Technological Information (STI) projects now spread over nine academic and research institutions in six Commonwealth countries of Kenya, Nigeria, Sierra Leone, Tanzania and Zimbabwe with three projects each, and Zambia with one project.
- ii the GEF / FAO / UNDP Bio-Diversity Project (1994) on environment, in which two Tanzanian libraries were involved, and
- iii the Eastern and Central Africa Educational Information Network project (ERNESA) supported by the International Development Research Centre of Canada (IDRC-Canada), (1993).

Because all these projects support the development and use of scientific and technological information in developing countries, particularly in academic and research institutions, it is the libraries belonging to these institutions which are also supported with donations of information technology so that they can organize, process and disseminate scientific information to their local researchers; academics and practitioners.

Finally, variations in possession of information technology among the libraries under study is affected by the overall importance and role an institution and its library (for example a university) plays in national development. The different status and roles different institutions have in a country, influence even the way some of them and their libraries are perceived by



donor agencies.

Institutions or libraries that perform national roles in education, health, research and the like, are likely to be favoured in terms of donor support than others that have no such roles. Donor support to institutions and libraries that provide their services nationally is perceived by the donors to be more important and contributing to the development of the entire nation through its trickle-down effect. Out of the researcher's experience, universities and their libraries seem to be given priority by donors in terms of support as they facilitate the trickle-down effect of the support given through their training, education and research roles. This in turn contributes to the overall national development.

Another equally important finding of the study on the status of information technology in libraries has been that:

- b. Despite the fact that each library in the study possessed at least one computer as basic IT equipment, this did not guarantee the possession of other basic IT-related accessories which are also vital for the effective utilization of the technology. Several libraries in the study were lacking or revealed shortages in many of the basic IT facilitating accessories.

Ten libraries (56%) for example, lacked CD-ROM drives and therefore CD-ROM databases; six libraries (33.33%) had no modems, hence could not provide E-mail connectivity; four (22.22%) lacked fax facilities. A similar situation was reflected in the systems and applications software packages as portrayed in Table 7. While systems and applications software packages are important in the booting of computers and execution of various IT-related information services and products needed by the library users, libraries lacking certain software packages and / or their up-dated versions could not therefore execute some of the IT-related applications upon which some information services and products rely. Variations in terms of software package versions were also quite common among libraries as their categorization based on different versions reveals (Table 7).

The above-mentioned research findings, namely, the undeveloped nature of information technology and the accompanying shortages or non-availability of other IT-related basic

accessories, also reflect another equally important finding that:

- c. generally, libraries have very low levels of IT connectivity. For example, connectivity to on-line and Internet services and networking.

These findings further imply that they adversely affect the type and level of information services and products libraries are capable of providing for their clients. As a result, the study came to the conclusion that, given the situation, many user IT-related needs were not being adequately in most of the libraries, because of their weak and unevenly developed IT infrastructure. This was particularly so in areas such as on-line information services and products.

As a corollary to the above-mentioned findings, another important finding was on the level and extent of exploitation of the potential of information technology. In the review of literature it was mentioned that exploitation to its full potential of the technology depends partly on the amount of technology available. In fact it was identified as one of the problems which could affect the sustainability of information technology (Camara,1988; Mulira, 1995). This scenario of information technology in libraries, implied another important finding, that:

- d. the maximum exploitation of the full potential of information technology in the concerned libraries was still very much restricted by the available technology, therefore affecting the satisfaction of user information needs. The explanation to this phenomenon could be that given the existing poor status of IT in almost all the libraries, many varieties of IT-related information services and products have not yet been introduced.

These findings in relation to answering research question number one, are important and very critical on the whole issue of effecting IT sustainability in libraries. Despite the fact that the introduction of information technology is be seen as a positive step towards IT development, the existing stage of IT development (which in turn determines the kind and level of information services and products rendered) is unlikely to facilitate even partial sustainability.

In the review of literature it was categorically stated that one of the strategies through which information technology could facilitate its own sustainability in libraries was through the provision of relevant and adequate IT-related information services and products that responded to user needs (Newa, 1993; Valadez and Bamberger, 1994; Freudenberg; 1994). It was also observed that the same IT services and products that were being generated, could be marketed to increase the technology's chances of sustaining itself. In so doing, the technology would be creating for itself a dependable user-base and therefore user support which could help to champion the need for its adequate funding. Given the study findings on the status of IT in libraries, one wonders how its sustainability could be achieved in the absence such support? Valadez and Bamberger (1994: 191) for example, have argued that the achievement of sustainability of any project may be partly affected by its inability to mobilize the support of its intended beneficiaries or key stakeholders. It is through such kind of support that beneficiaries can determine whether a project, for example in IT, should continue to be adequately funded or not, depending upon its contribution in responding to their information needs. It is the belief of this study therefore, that unless the status of information technology available in all the libraries under study is improved, services and products generated can hardly respond adequately to user information needs, and in turn encourage the kind of user support needed to promote IT sustainability.

The poor status of information technology existing in libraries under study, could be accounted for by several explanations. Rosenberg (1996: 404) and Mulira (1995: 96) for example, have related it to the poor IT status existing in the libraries because there is no serious and effective planning or informed decision-making on the part of the libraries and donors. Mulira (1995) has argued that had libraries themselves worked out IT policies and planning based on their articulated information technology needs, the ad-hoc IT development being experienced in most of them today would have probably been avoided. In other words, given the resource constraints in which most libraries found themselves, and the need for them to acquire information technology in order to improve their information services, the implication is that libraries have not had adequate time to effectively plan their IT requirements based upon their own needs. It also means that even if these libraries had time they would not have the required capacity in terms of resources to effect their decisions.

Finally, the poor IT status could also be attributed to too much dependence on the donors for almost everything affecting IT selection, acquisitions and therefore its current overall development. In other words, libraries had to accept whatever donors could make available, depending on the resources each donor had and could afford to donate. If libraries had had their own resources, the situation of information technology would have probably been positively different, as the acquisition of the technology could have been based upon exactly what these libraries needed. Mulira's (1995) observations on the status of IT in Uganda are still relevant even to academic and research libraries in Tanzania, that:

In most developing countries, the use of information technology was a result of isolated initiatives without preconceived strategies. As such IT equipment was being acquired by different donor organizations because computer vendors' commercial pressure and widespread expatriate / donor support had taken preference over direct recipient (government) control. African governments (as well as individual institutions) therefore, did not have much say in information technology procurement (Mulira, 1995: 96).

The above quotation provides an explanation as to why Tanzanian libraries encounter the unfavourable status of information technology. The fact has been that IT acquisitions and computerization in general in many of the libraries had taken place in an ad-hoc fashion without IT policies on planning, installations and implementation. In general libraries have suffered from the following: resource-constraints; lack of IT policies and systematic planning; lack of informed decision-making based on recipients' articulated needs; fiscal constraints; and inadequate managements. Much of the literature this researcher has consulted, has also identified similar factors or problems as to why the development of most of the donor-supported projects like IT in libraries, have not been capable of developing into fully-fledged and sustainable projects (Camara, 1988; Bossert, 1990; Freudenberg, 1994; Valadez and Bamberger, 1994). Unless libraries begin basing their IT general development on effective policies and strategic planning which in turn are guided by what they actually need, the sustainability of information technology could still be a long way away.

**(b) Status of IT human resources and IT use**

The above research findings relating to research question number one on the status, namely, undeveloped IT infrastructure, non-availability or shortage of IT equipment and accessories,

and poor or low levels of IT connectivity in libraries, implied that they adversely affected the effective use of the technology in libraries. Furthermore, since the use of available technology is also heavily dependent upon the the level of IT knowledge, skills and competence of the library staff, it was imperative that this study also investigated this aspect. Moahi (1996: 91) observed that effective library automation and utilization of information technology in developing countries has been slow to take off because of the lack of, and ill-prepared manpower. Training for library personnel which has been available up to now, has generally been traditional, not geared towards providing them with basic skills which could enable them to appreciate the potential and capacity of information technology, as well as equipping them to handle any information-related job which requires the use of the technology. Based upon these observations therefore, the investigation of this study on the status of information technology in libraries would not have been complete without considering the IT skills and knowledge levels libraries have in the effective use of the technology. This important information on IT skills, knowledge and competence partly provided answers also to research questions three, four and five on the aspect of use of the technology in libraries.

The need for properly trained library personnel has been reflected in much of the review of literature as being a crucial factor in facilitating IT sustainability (Bossert, 1990; Freudenberg, 1994; Stefanini,1995). A study by Garcha and Buttlar (1996: 33) for example, which profiled 60 African academic and research libraries in Ghana, Kenya and Nigeria on the issue of library automation and IT use, also discovered that the slow pace of library automation and the subsequent under-utilization of information technology in those libraries was mainly attributed to the lack of, or inappropriate training, particularly in the field of automation and the use of the computers. Similar findings have been expressed in another study on Zambian libraries, where one of the causes cited was traditional training programmes which hardly included modules or programmes on information technology applications to libraries or information technology management.(Chisenga, 1995: 22). In the case of this study, the importance of IT-trained library staff is still critical in facilitating the sustainability of information technology and cannot therefore be overemphasized.

The research findings on the level of IT skills, knowledge and competence among libraries in the execution of IT-related information functions and activities indicated that less than half of the libraries, (that is seven or 38.89%), rated their staff members as having adequate IT skills, knowledge and competence. However, eleven libraries or 61.11% stated categorically that despite the fact that some of their members performed some IT functions they nevertheless had inadequate IT skills, knowledge and overall competence.

Baker (1993: 45) who did a survey study on the availability and use of information technology in various Tanzanian organizations, similarly confirmed that in general IT professionals in the country were under-qualified for the kind of work they were doing, and the lack of requisite skills and knowledge was acute and a common occurrence. The source of the problem, according to Baker's study, was partly the donors of the technology in the sense that:

The donors are not assisting the training situation. Only 16 % of training was attributed to donors while 40 % of the hardware is donor funded...11 of the leading donors established that not one had guidelines or policy concerning the appropriate training in situations where computers are a part of a project. Training in IT has been neglected by the donors as an area of activity in which to sponsor staff.

Despite the fact that Baker's study involved very few academic and research libraries, it nevertheless reflects the general picture affecting all organizations using the technology in the country, including academic and research libraries. The situation is further confirmed by the libraries themselves in relation to the various areas they identify where IT training is vitally needed.

Based upon the perception of the libraries, Table 19 categorizes the eight areas where IT training was needed. Given these areas, it could be argued that all the libraries were deficient or lacked skills and knowledge in one or more IT areas, which in turn also affected staff competence in effectively carrying out IT-related information functions and services. The assessment of these indicated also that although training needs varied from one library to another, the general picture portrayed reflected that training was required across the range, from lower or basic to more advanced aspects. In view of this finding, it can be concluded that:

- a. generally, there is a pronounced shortage of IT skills, knowledge and competence in almost all the libraries. This implies also that there are great training needs which have not yet been satisfied as revealed by the identified IT areas where training and education were urgently needed.

The discussion on the status of IT skills, knowledge and competence among libraries leads to the another finding on the level of IT use. The scarcity of IT equipment and accessories, uneven development of IT infrastructure; low levels of IT connectivity, limited and inadequate IT skills, knowledge and competence affects the variety and level of IT functions, services and products generated or offered by the libraries. In turn this has a negative impact on satisfying user information needs and therefore also affects the achievement of IT sustainability in those libraries. Related to the above, other equally important findings by this study particularly in the use of information technology in libraries are that:

- b. IT use is still very low and much restricted to more basic in-house services. It has not gone to more advanced uses and application of the technology like Internet, LAN or WAN networking, or World Wide Web (WWW) connectivity.
- c. Furthermore, even its use in the libraries themselves has generally not penetrated into each and every area of library / information services.

Despite the fact that donors are partly responsible for not including IT training as part of their support which leads to low levels of IT use in libraries, the whole question reflects the absence of effective IT policies, planning and management on the part of recipient libraries. Libraries themselves, and in particular their managements, have the responsibility to ensure that in order to maximize the potential of available information technology, policies related to IT human resources development do not have to wait for support from donors. If the libraries themselves were to plan for what information technology to buy or acquire, there would be more likelihood of preparing for its effective use. Earlier findings in this study and the review of literature identified the lack of policies and proper planning of information technology by the libraries as one of the problems affecting the sustainability of the technology. Likewise, the lack or inadequacy of IT skills and knowledge among library staff can also be attributed

to the same cause or factor. A study by Nawe (1995: 23) for example, on the overall development of library and information human resources and the library profession in Africa, has examined the source of the problem of skills acquisition and its use in libraries in a much wider context. According to that study, it is the laxity, complacency, and poor planning of library and information services by library managements and information professionals as a whole that becomes a problem. The failure by the two categories to strike a desirable balance between planning for information / library resources in general and human resources in particular, is perceived by Nawe's study to be the factor affecting the acquisition and utilization of appropriate skills including, IT skills in libraries. The study notes that the problem of lack, and under-utilization of skills affects library and information services because managements put too much emphasis on, and are more obsessed with acquiring of more and more information resources rather than explicit human resources planning and development, based on identifying and defining the skills required to meet user needs.

Nawe's observation confirms some of the findings this study and other studies have come up with on libraries formulating relevant IT / information policies that could bring about effective planning of acquisition and utilization of resources. It is therefore a factor that lack of, or poor effective planning based upon relevant IT/information policies in libraries, is affecting not only the sustainability of libraries themselves but has also been the source of other problems like lack of skills or the much-needed resources. A study by IDRC (1989), and that by Mchombu and Miti (1992) concur with Nawe's observation on the need for effective planning in libraries based on information or IT policies. The need for information and IT policies informed by effective strategic planning therefore remains relevant and critical for libraries if the sustainability of information technologies and the library / information sector as a whole is to be achieved.

### **5.2.2 Manner of IT acquisitions, financing, maintenance and sustainability**

The objective of research question number two of the study was twofold. Firstly, to gauge



the extent of contribution in terms of the level of funding IT acquisitions, maintenance and general sustainability between the donors and recipients of the technology. Secondly, to establish whether libraries as recipients of the technology had funding mechanisms through which they could take over IT's future maintenance and sustainability. The assumption of the study was that given that libraries already owned and used the technology, and have thus recognized its importance and potential, would therefore explore alternative ways of effecting IT sustainability out of their own libraries' resources.

Research results emanating from a combination of seven questionnaire items on the sources of IT funding, established that funds emanating from donor grants only was ranked first. This accounted for an overall average of 62.37% of all the possible funding sources. This source of funds was indicated by 12 of the 18 libraries and affected the acquisition of computers, printers, CD-ROM drives, systems and applications software packages. A combination of donor and library's funds ranked second representing 33.93% and being mentioned by six of the libraries. It was acknowledged that despite some local contributions by some of the libraries towards IT funding, donor contribution was always greater than that of the former. Lastly, were funds obtained only from own libraries' budgets which ranked third, This source of funds proved to be insignificant as it accounted for only 5.55% and was utilized by only one library. No other sources of IT acquisition funds were mentioned by the libraries. Tables 12, 15 and 16 confirm these findings. In the same Tables the numbers of libraries assisted by each donor, the names of actual donors involved in supporting each library and the sources of IT acquisition funds are categorized respectively.

In answering research question number two of the study, it was therefore established that:

- a. The source of funds for the acquisitions of information technology in almost all the libraries studied with the exception of one, emanated from funds provided by the donors. In most of the cases, information technology was donated to libraries as part of other donor-supported major information projects being implemented by the libraries. As such, the up-dating and maintenance of the IT had been, and was still, dependent on the resources earmarked for those major donor-supported information projects still existing in the libraries.

This finding is further supported by those of other studies (Camara, 1988:54; Priestley, 1993:3 ; Baker, 1993: 5; and Rosenberg, 1996: 44). Baker for example, observed that from the late 1980s and throughout the 1990s, donors in Tanzania have been a powerful influence in almost all sectors, whereby the total external assistance stood at 46.6% of the country's Gross Domestic Product. Consequently, most of their aid projects have had some part of the budgets allocated for computers and information technology-related services. Due to this fact their policies on acquisition of computer equipment, services and personnel have been influential in almost all of the organizations they have been supporting, including libraries.

Related to the above, another equally important finding the study has come up with is that,

- b. All the libraries in the study obtained information technology from more than one donor organizations hence they dependent upon several donor agencies in the acquisition and sustainability of the technology.

From finding (b) it was possible for this study to explain the differentiations in IT equipment possessed by each of the libraries, the proliferation of varieties of models, makes or brands of IT equipment, varieties of systems and applications software packages and different hardware systems with varying performance capabilities. In other words, the fact that most libraries obtained their IT from more than one donor organization partly explains why there are varieties of IT equipment in terms of models or makes of computers and other accessories. The same factor also accounts for the unequal or uneven IT development characterising all the libraries.

The categorization of donor organizations in relation to libraries assisted, indicated that 32 different donor organizations were involved in supporting the various libraries between 1986 and 1996. The study has established that normally most the libraries obtained IT support from between two and five different donor agencies (Tables 15 and 16). Other studies like that of Cyamukungu (1996) have identified a similar pattern as regards donor support in the introduction and establishment of computer network infrastructures in various parts of Africa. It is this pattern in donor support which could help to explain the cause of IT differentiation and the proliferation of different IT models or makes in various institutions like libraries.

Cyamukungu (1996: 91)for example, supports this explanation that:

Computer network infrastructures in Africa were installed mainly taking into account the strategies and perhaps even the interests of aid providers, (and) ...as such it... resulted in a proliferation of standards and networks which do not necessarily fit the needs of African users.

Another explanation for the uneven development of information technology and the proliferation of different IT standards and models in libraries has been the nature of donor support itself. Such support was very much limited in terms of what was being donated, the duration of the support, and the fact that it was usually ad hoc. All these aspects made it necessary for libraries to seek more and more donor support in order to achieve all-round IT acquisitions (Rosenberg, 1996). With the wide variety of IT hardware; software and other IT accessories, implies that it would undoubtedly be difficult for libraries to undertake resource-sharing, which as the review of literature as indicated, could facilitate some form of IT sustainability. Taking into account that all the libraries in this study are resource-constrained, the existence of different models, varieties of hardware and software systems, which may sometimes be incompatible, could jeopardize IT resource-sharing efforts among them.

With regard to IT up-dating, maintenance and its general sustainability among the libraries, the findings of the study have indicated that all libraries were still dependent upon resources either earmarked for the major donor-supported information projects or from other donor-supported projects being newly established. This is still the case in view of the fact that information technology was introduced in libraries not as independent projects in their own right with their own resources, but as appendages or “assisting technologies” intended to service the information needs of other donor-supported projects. (Schware and Choudhury, 1988). Therefore, for the libraries to sustain the previously donated information technologies, they are seeking out other new donors who would be willing to initiate and support new projects of which part of their resources can be used to sustain previously introduced information technologies. This factor helps to account for the large number of donor agencies / organizations supporting each of the libraries as revealed by this study.

Although the study has established that the resources of a newly introduced donor-supported projects are used to sustain the previously introduced information technology, libraries themselves are beginning to realize that unless some alternative resource-generation strategies are found, the sustainability of information technology in libraries could be difficult to achieve. This realization comes about especially when a library fails to attract new donors from whom resources can be obtained and reallocated to support the existing information technology. As a result, the majority of libraries (14 or 77.88%) are currently allocating part of their annual budgets specifically to the development and sustainability of information technology. Depending upon the budgetary allocations of each library, the range of between one and 4.5% of the annual budget was being dedicated to the development of information technology in those 14 libraries.

The importance of library budgeting as part of effective planning of library / information services was highly emphasized by this study. It was mentioned that in case of libraries and any other organization big or small, budgeting was important as one of the means through which an organization could obtain and allocate resources rationally for specific activities or functions. Despite the fact that some libraries perceived the library budgeting exercise as not being very important as it sometimes does not guarantee the availability of actual funds for items budgeted for, the inclusion of information technology as a line-item in every annual budget is a very significant step towards its future financial support. It signifies the recognition, acceptance and integration of information technology as an important part of library resources which needs to be supported like other information resources such as books and journals. Although the allocations for IT among all the 14 libraries was still relatively small when compared to other aspects of library / information services, it however reflects some initial commitment on their part towards its future sustainability.

### **5.2.3 Policies determining IT use in libraries**

Research question number three of the study (namely, what and whose policies were determining the use of available information technology in libraries) intended firstly, to

investigate ways in which the technology was being used in libraries. Secondly, it sought to find out whether its use was being determined by the policies of the donors, the recipient libraries, or both. It was assumed by this study that since donors were responsible for the acquisition of the technology for libraries, they would also probably be responsible for making decisions affecting its use. This underlies the argument which was introduced in chapter one, that if donors dictated on the nature of use of the technology in libraries, it implied that recipient libraries had no full control over its use, and therefore could not effectively work out ways of sustaining it. Furthermore, the need for information on IT policies was prompted by what the study identified from the literature review on the importance of policies facilitating effective use of the technology and thus its eventual sustainability.

A number of the studies reviewed emphasize that information policies in libraries, particularly policies affecting the development and use, were the cornerstone of its effective development and hence its sustainability. (IDRC, 1989; Agha, 1992; Akhtar and Melesse, 1992; Rosenberg, 1996). The same studies have also argued that the failure of information systems in developing countries to sustain their information services, including information technology, resulted mainly from the lack of national and / or institutional information / IT policies. Information policies were thus important because they provided the basis for effective planning of information technology and related services in response to library user needs. Policies also provided vision and direction in the planned development of the technology itself. Given this importance in relation to facilitating the sustainability of information systems particularly information technology, libraries were therefore requested to provide information on whether they had IT policies. The findings inferred from the analysis are that:

- a. The majority of libraries (that is, 14 or 83.33%) have had no policies whatsoever guiding the selection and application of the technology. The findings indicated further that in the absence of such policies, decisions on functions for which the technology was to be used were normally being made by both donors of the technology and library managements.

The absence of IT policies or guidelines on its use among the majority of libraries, could be accounted for by the level of IT development that they have so far attained. As observed in one of the findings to research question one, the general status of IT acquisitions and development of IT infrastructure were still at the initial stages of development and donor-dependent. As a result, libraries had not yet developed IT policies that could take in not only IT planning and development relevant to the acquisition of the technology and related accessories, but also its use. Such policies affecting the planning and development of information technology are absent from most African libraries, not only in Tanzania. Abifarin (1993) for example, refers to the absence of IT policies in 17 Nigerian university libraries, concluding that information technology in those libraries was inadequate and under-utilized. Among other factors, he identified the lack of IT planning and policy development relevant to the acquisition of computers and related equipment, and too much dependence on donors, as some of the constraints facing libraries in effecting an all-round IT infrastructure development.

The second reason for lack of policies on IT in libraries is the influence donors of the technology still have upon those libraries. The fact that libraries do not have the necessary resources to facilitate IT acquisitions based on their own identified needs, implies also that effective IT policies will not easily be achieved. One of the problems this study identified in relation to IT budgeting was that libraries were sceptical about the budgeting exercise because it did not guarantee the availability of actual funds. The same argument could be advanced for the lack of IT policies. Why should libraries involve themselves in policy formulation and planning if they know that the resources to effect those plans would not be forthcoming? Without their own resources libraries see no reason for formulating IT policies and development plans which cannot be implemented. This kind of mentality could partly explain the lack of IT policies and effective planning among most of the libraries studied.

Related to finding (a) above, another equally important finding with respect to research question number three was that:

- b. given the absence of IT policies in libraries, the majority of these libraries partly depended on external sources both local and foreign in making decisions affecting the use of the technology.

This has been confirmed by the research results whereby 11 (61.11%) of the libraries indicated that decisions on what functions or activities IT was to be used for, were normally being made by both the donors and library managements. Only seven (33.33%) were not in this position. However, within this situation regarding the decision-making process on IT use, it was difficult for this study to determine the extent or degree to which library managements were actually allowed to make decisions given that the influence of donors was still prevalent.

Some studies reviewed earlier, for example Rosenberg (1996: 350), observed that donors themselves have had no policies affecting IT assistance and hence its use in libraries. On the other hand libraries themselves indicated that some freedom existed for library managements to make decisions affecting both the selection and use of information technology. It could, however be argued that the influence of donors was still highly present and in some way affected all matters concerned with IT in all the libraries. In other words, donors of the technology still either directly or indirectly, influenced decision-making processes on matters affecting the use of information technology. Consequently, library managements could not decide on strict choices or decisions affecting the use of the technology in their libraries which in any way by-passed decisions made by the donors. This being the case, it can also be said that recipient libraries were not yet in full control of the choice and use of the technology they had. This has serious implications in terms of its sustainability. Unless the libraries perceived themselves to be in full control of the technology as regards its use in satisfying the information needs of their users, its sustainability could not be effectively planned and implemented by them as recipients.

## 5.2.4 Problems affecting IT use and its sustainability

Research question number four of the study, dealt with what bottlenecks there were in the use and sustainability of information technology, and how the problems were being or would be solved. This was based on the assumptions that all the libraries were in the infant stages of introducing and using the technology, implying also that they were being confronted with a number of problems. It is therefore vital to identify those problems, in order to focus attention on them, and on possible solutions which in turn may become strategies towards effecting IT sustainability. Secondly, the study aimed to find out whether libraries had practical solutions to those problems which they could share with one another. Based on their own experience and perceptions in using the technology, three items of the questionnaire then requested libraries to identify the problems and whenever possible suggest ways in which they were dealing, or intended to deal, with those problems.

To provide answers to research question number four, responses from libraries were analysed and conceived within three broad categories of problems affecting the use and sustainability of information technology. From the frequency of responses and related percentages, the problems were categorized and summarized in Table 21 as follows:

- a. Problems resulting from or associated with the use of the technology itself, that is, information technology-related problems;
- b. Problems resulting from lack or scarcity of resources, that is, resource-related problems; and,
- c. Problems experienced as a result from lack and / or non-implementation of policy and / or management decisions affecting the entire library, that is, management-related problems.

Each specific problem was further ranked (from one to ten) in order to determine its extent or level of seriousness as perceived by the libraries. Given the differences in the percentages for each category of problems, the research results indicated the following findings:



- a. Problems resulting from the technology itself and its use (technology-related problems) rated first with an overall percentage of 52.87% of all the categories. Rated second and representing 43.68%, were problems associated with the lack or scarcity of resources, that is, resource-related problems.

The category of problems resulting from the technology itself were identified as being the most serious. These emanated from the fact that some of the technology donated to libraries was not the most up-to-date available. Obsolescence and low performance capabilities of some IT equipment and accessories are part of these technology-related problems. Others resulted from shortages or non-availability and incompatibility of various items of equipment.

Resource-related problems included those problems affecting the effective use of the technology as a result of scarcity or absence of needed resources. These included: insufficient local funding; low levels of IT skills; inadequate knowledge and competence among library staff members; lack of in-country training opportunities and programmes at advanced levels; and difficulties faced in retaining IT trained and skilled library personnel as a result of poor remuneration packages offered by the libraries.

Policy- and management-related problems were rated third with an over-all total percentage of only 3.45%. These included, for example, limited capacity and opportunity in decision-making processes. In some instances, for example, library managements lacked discretionary powers in making decisions affecting the development of their library and information services in general, unless those decisions had the blessing of their superiors and / or donors. Another problem affecting the management of libraries related to the lack of information, knowledge and experience on ways in which information projects with IT components begun in libraries could be sustained from the library's local resources. The lack of information on how external donor assistance could be effectively integrated and used within the library environment so that it does not perpetuate or entrench the vicious circle of vulnerable dependence on the part of recipient libraries is one of the new problems identified by the study. Other new problems identified included: how to effect some of the sustainability

strategies that needed initial resources or decision-making by other bodies like, undertaking resource-sharing; twinning programmes; instituting user fees and charges; and the commercialization of library resources to the private sector. Most of the problems affecting IT use and sustainability identified by the libraries concurred or linked in well with those that were identified by other studies reviewed.

Based on the research results, the solutions advanced to all these problems indicated some potential and optimistic proposals. Libraries perceived them as not being insurmountable. Generally, the proposed solutions were conceived within two categories, namely, solutions to IT-, and resources-related problems, and policy- management- related problems . For example, solutions for most of the problems resulting from the technology and scarcity of resources relate to ways in which libraries could effectively generate adequate resources of all types. This could be done if libraries ensured that they attained their own and guaranteed sources not only of adequate funding but also, other types of resources. This could be done through cost-recovery and cost-sharing mechanisms, enlisting local as well as external assistance, diversifying sources of funding, developing entrepreneurial spirit by marketing information services and products that libraries produce and establishing local, regional and international twinning programmes. Other methods of resource-generation proposed included the effective and rational use of resources through balancing budgets by reducing operating expenditures and unnecessary overhead costs. All these methods imply that libraries needed to increase their resource base and at the same time rationally and effectively use whatever resources were available.

Despite the fact that all libraries seemed to have a wealth of innovative ideas in the form of solutions to these problems which in turn could act as IT sustainability strategies, it is also observed that it could be difficult for them to implement these solutions fully without developing a long-term resource generation and management strategy. This has to be informed by clearly defined IT policies embedded in the long-term strategic planning. It is through such a strategy that sustainability strategies identified by the literature and this study, can effectively be implemented. Since effecting IT sustainability is not a discrete activity but a process involving various activities, then long-term planning among libraries is equally

critical.

Experience has indicated that most of these sustainability solutions have at one time or the other been attempted by the libraries, but results have been minimal. For example, the literature abounds with accounts of on resource-sharing among libraries but success in such endeavours has not been forthcoming (Rosenberg, 1992). As discussed earlier under policies determining IT use in libraries, planning has been missing, thus, denying libraries an important opportunity in the overall process of defining their specific goals, objectives, priorities and needs in relation to achieving effective and sustainable library / information services. Priestley (1993) and Rosenberg (1996) have argued that lack of planning among libraries was not a new phenomenon and had been one of the major stumbling blocks in the redefinition of the vision and development direction of the libraries. They further argue that without strategic library / information development plans, it was very difficult to envisage where libraries were going, what they planned to do (for example in relation to IT sustainability) and what resources could be needed in order to fulfill their intended goals and objectives.

Another equally important observation coming from the interviews was that libraries were capable of identifying the potential solutions or strategies to the problems but seemed to be unclear as to how they could be implemented. As discussed earlier, some of these solutions required some initial resources for their implementation, which many of the libraries do not have, for example, resource-sharing with other libraries, or what could be done to enhance the role and value of information (or information technology) in order to facilitate its effective moral and resource support?

Solutions to problems in the policy-management-related category included, those solutions which could facilitate effective library / information policy formulations, planning and the execution of important decision-making issues affecting the overall support and development of the whole library. According to the libraries these included: the need for some autonomy on the part of the library managements (with minimal interference from their superiors or the donors) to make the most crucial policy and management-decisions affecting both the

planning, management and development of library / information services. It is believed that with some authority to make such crucial decisions, aspects such as IT development could be effectively planned, some ways of resource-generation worked out and the technology itself integrated as part and parcel of the normal library resources. However, the fact that libraries like other units within an organization, have to comply with the established chain of authority or command, and have to make decisions on library / information development within the confines or limits laid down by their parent organization managements, could make the implementation of this proposed solution difficult. Accordingly, the failure of library managements to exercise fully their power of decision-making and therefore the execution of crucial decisions affecting various aspects of development, has been identified even by other studies as one of the most contentious areas affecting the smooth operation of library / information services, including the sustainability of information technology (Rosenberg, 1996). Other solutions proposed to policy-management-related problems include the need for training and the sharing of experiences among libraries with IT. It is believed that through training library managements and professionals can be equipped with managerial and management skills and expertise required for the management of information and information technology in particular. However, given the limited training opportunities in Tanzania, particularly in IT, stress on the sharing of experiences and in-house training among the libraries were considered necessary.

In summarizing this section, it should be reiterated that most of the problems identified by the study seem to be similar to those that have been identified by other scholars. These have been conceived within three categories of problems resulting from: the technology itself; those associated with the scarcity or absence or inappropriate use of available resources of all types (physical; fiscal and human); and problems related to lack of IT policies and / or inefficient or lack of opportunity for the application of effective management principles and practices. In addition, the study has also identified new or peculiar problems affecting the achievement of sustainability. In particular, these are: the absence of information on the part of libraries on how donor support can be effectively utilized in the library environments so that it does not entrench the vicious circle of vulnerable dependence on donors, and how to implement some of the sustainability strategies which either needed initial resources or depended upon

decisions made by the library's higher management authorities like library parent organization management or donors.

### **5.2.5 Strategies for effecting information technology sustainability**

Research question number five related to achieving objectives four and five of the study, namely whether the sustainability of information technology in libraries was feasible and if so, what would be the potential and actual strategies libraries could put in place in order to accomplish it. From the review of literature it was observed that in many of the donor-funded projects, including information technology projects, much emphasis was placed, and much information was available, on the project implementation phase, while little was known about factors which would affect the future sustainability of the project operations. In other words, there are adequate guidelines on how to make the implementation of projects more efficient, but there is little advice on how to design sustainable projects that will achieve their intended objectives as long as it is necessary. This implies that the question of a project's future sustainability has more often not been considered when formulating and implementing projects by both donors and recipients. Two factors responsible for the non-sustainability of projects this study had observed included the nature of support given by the donors, and the fact that such projects are planned without the inclusion of future sustainability mechanisms or tools which could guarantee their future operation. For example, the nature of most of donor support to libraries has been normally small or limited in what it supports, offered in an inconsistent and ad-hoc fashion and not long lasting. Such support has been incapable of creating institutional capacity building among the libraries to facilitate and guarantee the future sustainability of information projects resulting from such support.

Based on the above-mentioned observations and to provide answers to research question number five of the study, views and perceptions of libraries were requested on the feasibility of IT sustainability. Requested also were proposals on strategies which could facilitate and effect IT sustainability in the absence or ending of donor support. The findings on this

question indicated that 13 libraries (72.22%) thought that IT sustainability in libraries was feasible, three (16.67%) thought it was not, and two (11.11%) were undecided on the issue. Table 20 therefore provides the categorized summary of 17 strategies proposed by the libraries towards effecting IT sustainability. Depending upon the frequencies of scores and resulting percentages for each strategy, it was possible to rank the proposed strategies according to the level and extent of importance as perceived by the libraries.

Resource-related strategies, that is, those strategies which if effectively implemented could raise or generate an adequate resource base for libraries, were rated highest, representing an overall average of 54.54%. These were considered to be the most important strategies which could facilitate the sustainability of information technology.

Related to the above findings it has been found by this and other studies, that there is a direct relationship between resource-related problems identified by the libraries and the resource-generation strategies. In other words, since resource-related problems were identified to be the most serious in affecting the use and sustainability of information technology, resource-generation strategies were thus indicated to be the most important among the proposed strategies towards IT sustainability. This again links in well with a variety of sustainability strategies identified in other studies reviewed, which in their totality intend to facilitate adequate resource-generation as a vital component in IT sustainability. (Bossert, 1990; Agha, 1992; Rosenberg, 1996; Newa, 1993; Stefanini, 1995; Freudenberg, 1994).

Ranked second (23.23%) were strategies concerned with the effective implementation of various aspects related to policy, management and planning within the library / information environment. These affect the formulation of effective library policies as an essential ingredient for effective planning and implementation of those strategies in the library environment (IDRC, 1989; Mchombu and Miti 1992; Rosenberg, 1996). Finally, there are strategies which aimed at improving the effective recognition of the value and role of information as a resource. These strategies, related to information as a resource, represented 23.23%. Such strategies intended to enhance the role and value of information as a resource and therefore the need for its adequate support and funding. It is assumed that many problems

affecting the development of the information sector, including information systems, result from the low status accorded to information in development. If the role and value of information is therefore enhanced and recognized, the possibility of its adequate support in terms of resources could materialize and facilitate the sustainability of the technology and various functions related it (Agha and Akhtar, 1992).

Based upon these research results the following findings were identified:

- a. the majority of libraries, (that is 13 or 72.22%) concurred that attaining IT sustainability in libraries was possible *only if* libraries themselves evolved over a period of time and effectively implemented all or many of the proposed sustainability strategies.

Based on Tables 20 and 22, seventeen and thirteen strategies and basic conditions (or requirements) for attaining sustainability of information technology were identified respectively. According to the perception of the libraries, these were further ranked to indicate each one's level of effectiveness in achieving this. These strategies include: enlisting support from all stake-holders; enhancing the role and value of information; upholding the identification of user IT needs and responding to them adequately; exploring various ways through which adequate resources-generation could be attained and undertaking local, national and international resource-sharing measures. Other strategies include: effecting strategic planning based on sound IT policies; effecting training procedures that would enhance the development of new skills capable of facilitating the effective use of information technology; and the need to develop positive attitudes among library / information staff which could lead to a more self-reliant attitude. In summary, all or many of the proposed strategies and conditions for effecting the sustainability of information technology in libraries relate to the generation and rational use of resources, the need for sound IT policies, application of effective strategic planning and management skills and practices and the ways in which the role and value of information as a resource in development could be enhanced so that it is accorded the support and resources it needs.

Despite the fact that libraries perceived IT sustainability as being feasible, an attitude of apprehension was nevertheless expressed by some of them, libraries particularly on the implementation of some strategies. It was indicated that decisions on the implementation of such strategies were beyond library managements' realm of control and could therefore not be decided upon by the libraries alone unless those decisions have the blessing of their superiors within the parent organization. These included for example, decisions on introducing user charges or fee-based services; matters affecting the use of budgets in libraries; or the commercialization of information services and products to the private sector. The failure for library managements to exercise fully their power on matters or decisions affecting the development of library/information services has been cited in this study as one of the problems affecting the development and therefore sustainability of information systems. Furthermore, many of the strategies that libraries have proposed towards IT sustainability have never been practised (or practised but with minimal success) to test their feasibility and therefore their effectiveness in alleviating the problem.

Another equally important observation with regard to the proposed strategies, is that no single strategy can effectively attain IT sustainability. Libraries need to implement all or most of the proposed strategies concurrently given their interdependence and interrelatedness. It is because of this interrelationship that the importance of library strategic plans and planning become critical. Effective implementation of all the strategies could be possible if libraries approached it within a planned sustainability framework which specifies the resources needed and what has to be done at a particular stage of their implementation. This is important because as said earlier, the attainment of IT sustainability has to be conceived as being dependent on the interaction and development of many strategies which through a complex web and interrelationship will jointly impact on the improvement and enhancement of the sustainability of the library as a whole and information technology in particular. Finally, the attainment of IT sustainability could be difficult to achieve unless it is conceived within the total sustainability of the entire library / information system. This is necessary given the symbiotic relationship existing between the library as an information system and information technology. It is the belief of this study that perhaps this could be the only rational and appropriate approach towards the sustainability of information technology in libraries.



## 5.3 Summary

In summary, this chapter has revealed how academic and research libraries in Tanzania perceived the feasibility of information technology sustainability in their environments. Most of the libraries surveyed were of the opinion that the sustainability of donor-supported information technology was feasible following donor withdrawal or the ending of such projects in libraries, but it very much depended on the concurrent and effective implementation of all the proposed strategies. Some of the works reviewed in this study, (for example, Agha, (1992); Agha and Akhtar, (1992); Rosenberg, (1996)) have a similar view, provided libraries perceived the problem as one of their planned priorities. The study began with the major question namely, with the introduction of information technology in Tanzanian academic and research libraries through external donor funding and support, would it be possible for them to effectively attain the sustainability of these technologies following donor withdrawal or ending of donor-supported IT projects? This major aspect of the study was explicitly reflected in the five research questions whose results have been interpreted and discussed in the current chapter.

One very important observation of this exploratory study has been that besides the fact that most of the libraries concurred that IT sustainability was possible from within their own resources, they also indicated that they had a wealth of ideas in the form of potential strategies which if implemented effectively could lead to some form of IT sustainability. However, given that many of the proposed strategies have never been tried by the libraries and some need some initial resources that are sometimes lacking, it is difficult for this study to determine exactly the extent to which these could be successful or not. It could be the subject of another study to determine whether proposed IT sustainability strategies are effective or otherwise. It has also been observed that there is concurrence on problems and strategies affecting/effecting sustainability between those identified in the review of literature and those identified in the research findings.

Finally, it is believed, that the present interpretation and discussion of the research results have met the purpose and objectives set out in section 1.4 of the study. These included: to explore the status of information technology in academic and research libraries; funding sources of IT acquisitions; policies determining (and problems affecting) IT use and its sustainability in the libraries concerned; and efforts being or those that can be made by the libraries in effecting long-term IT sustainability.

## 5.4 References

- Agha, S. S. 1992. **Sustainability of information systems in developing countries: an appraisal and suggested courses of action**. Ottawa: International Development Research Centre, (IDRC) . ( Research report commissioned by IDRC). Manuscript No. MR 316e.
- Agha, S. S. and S. Akhtar. 1992. The responsibility and response: sustaining information systems in Developing countries. *Journal of information science*, vol.18: 283-292.
- Akhtar, S. and M. Melesse. 1994. Africa, information and development: IDRC's experience. *Journal of information science*, vol.2 (5): 314 - 322.
- Abifarin, E. P. 1993. Availability and use of information technologies in Nigerian university libraries. *Library review*, vol. 42 (5): 4-14.
- Baker, S. 1993. **The survey of information technology in Tanzania**. Dar-es-Salaam: Tanzania Commission for Science and Technology.
- Bossert, T .J. 1990. Can they get along with us? The sustainability of donor-funded health projects in Africa and Central America. *Social sciences and medicine*, vol.30 (9): 1015-1023.
- Camara, A. B. 1988. Implementing the information technology strategy for Africa: the first stages. *Information development*, vol.6 (1): 55-61.
- Chisenga, J. 1995. The status of information technology in Zambian libraries. *African journal of library, archive and information science*, vol.5 (1): 19-24.
- Cyamukungu, M. 1996. Developing strategies for an African computer network (short communication). *Information technology for development*, vol.7: 91-95.
- Freudenberg, K. 1994. New technology for rural women: paradoxes of sustainability. *Development in practice*, vol.4 (1): 13-22.
- Garcha, R. and L. J. Buttlar. 1996. Profiling African libraries: automation in **Ghana, Kenya and Nigeria**. *Library review*, vol.45 (6): 25-35.

- International Development Research Centre , (IDRC). 1989. **Sharing knowledge for IDRC's information strategy for Africa**. Ottawa: IDRC. (Technical study 64e, f).
- Kanamugire, A. 1995. Partners in developing CD-ROM services for developing countries. *Libri*, vol.45: 106-112.
- Kerlinger, F. N. 1973. **Foundations of behavioural research**. (2nd. ed.) New York: Holt Rinehart.
- Line, M. 1982. **Library surveys: an introduction to their uses; planning; procedure and presentation**. London: Bingley.
- Mchombu, K. and K. Miti. 1992. Formulation of national information policies in Africa: some unlearnt lessons. *International information and library review*, vol.24: 137-171.
- Moahi, K. 1996. Training of African librarians for the new information age: progress in **Botswana**. *Information for development*, vol.12 (2): 91-95.
- Mulira, N. K. 1995. Managing information technology in Uganda: strategies and policy formulations. *Information technology for development*, vol.6: 95-105.
- Nawe, J. 1996. Human resource development and the development of libraries and library profession in Africa. *African journal of library, archive and information science*, vol.6 (1): 23-30.
- Newa, J. M. 1993. The sustainability of information technology innovations; CD-ROM technology at the University of Dar-es-Salaam. (Proceedings). **Survival strategies in African university libraries: CD-ROM technology in the service of information**. Organized by the University of Zimbabwe, / America Association for the Advancement of Science. Harare, Zimbabwe, 2- 5th August 1993. Pp 77-83.
- Priestley, C. 1993. **SAREC library support programme; evaluation and review: Ethiopia; Mozambique and Tanzania**. Stockholm: Gotab. (SAREC Documentation series, 1993:1)
- Priestley, C. 1996. Donor policies and practices. In: D. Rosenberg, **University libraries in Africa; a review of their current state and future potential**. Vol.2 (case studies). London: International African Institute.

- Rosenberg, D. 1992 . Can libraries in Africa ever be sustainable? *Information development*, vol.10 (4): 247-251.
- Rosenberg, D. 1996. **University libraries in Africa: a review of their current state and future potential.** London: International African Institute.
- Schware, R. and Z. Choudhury. 1988. Aid agencies and information technology development. *Information technology for development*, vol.3 (4): 145-158.
- Stefanini, A. 1995. Sustainability; the role of NGOs. *World health forum*, vol.16: 42-46.
- Valadez, J. and Bamberger, M. 1994. **Monitoring and evaluation of social programs in developing countries.** Washington, DC: World Bank.
- Van Maanen, J; Dabbs, J. M. and Faulkner, R. R. 1982. *Introduction. Varieties of qualitative research.* Beverly Hills: Sage Publication.

# CHAPTER 6

## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

In summary, this sub-section revisits the main purpose; the specific objectives as well as the research questions which guided the study. In addition, a brief discussion of the research methodology employed is made together with the techniques applied in the analysis and presentation of data.

### 6.1 Purpose of the study

The purpose of this study was to explore and investigate the status of information technology and strategies which academic and research libraries in Tanzania can adopt in order to facilitate the sustainability of information technology which has largely been acquired through external donor assistance. The need for such a study was based mainly on the assumption that if information technology is locally sustained and properly utilized, it can contribute positively to effective library and information services in particular and national development in general. While it is acknowledged that donor assistance in the introduction of information technology came in when libraries needed it most as a result of resource constraints, such assistance has however not been able to create a strong foundation for an all-round IT infrastructure adequately suited to meet and satisfy the information needs of library users. The second assumption has been that continued dependence on donors for the acquisition and development of information technology in these libraries was not only stifling their efforts to explore local mechanisms and resources for developing the technology based on their own information needs, but was also further entrenching their dependence.

Rosenberg (1994: 250) for example, has been of the view that: “too much dependence on donors entrenches further dependence. Once donor assistance ceases, the activities also cease

and nothing happens at all in libraries. African librarians begin to lack confidence to make their own decisions without donor approval”. Despite the fact that the problem of sustainability, particularly of information systems, has engaged the minds of information professionals for quite some time, very little documentation exists on the subject, let alone on the sustainability of information technology. Based upon these assumptions the inevitable issue of concern for this study then was, to investigate local-based strategies which Tanzanian academic and research libraries could put in place to achieve the sustainability of their donor-funded information technology.

Related to the above-mentioned problem the study intended therefore, to achieve the following specific objectives:

- i to assess the existing status of information technology in libraries under study;
- ii to investigate methods, ways, or means in which information technology was being acquired by the recipient libraries;
- iii to investigate and evaluate the ways in which information technology was being used and find out whether its use was being determined by donor and / or recipient library needs or policies;
- iv to find out what efforts recipient libraries were making in effecting the sustainability of information technology currently in use;
- v Finally, to propose or recommend strategies which could lead to effective sustainability of information technology in academic and research libraries in Tanzania.

In order to accomplish the above-mentioned objectives of the study, the following research questions were set to guide the overall conduct of the study:

- i What was the current status of information technology in libraries under study with regard to:
  - a) information technology available?

- b) personnel?
  - c) information services being offered?
- ii How was information technology acquired; who financed seed-money for information technology equipment and its future sustainability?
  - iii What and whose policies were determining the use of available information technology?
  - iv What were the bottlenecks in the use and sustainability of the technology, and how were the libraries solving and / or anticipating solving them?
  - v What strategies were in place or could be put in place in effecting the sustainability of information technology for its long-term use?

### **6.1.1 Research design and methodology**

The gathering of relevant data and information from the field was done over a period of five months from June to November, 1996. The following research instruments were applied in the process of data and information collection:

a. The questionnaire:

In the absence of other research and studies on the problem, and the fact that this has been the first study in this area, it was felt that the most useful approach would be to conduct a survey as broad as possible with no attempt at population sampling. The questionnaire was the main data and information gathering instrument used in the survey. The design of the questionnaire items was highly unstructured given the under-researched nature of the problem under investigation. This was important to the study, in that it gave respondents not only the freedom to give as much detail as they liked in responding to the items; but it also enabled them to clarify and qualify their answers basing upon their own perceptions, experiences and frame of reference. In addition this type of design of the instrument (s) is recommended particularly for studies that are either exploratory or if the research instruments are original as is the case with this study (Line, 1982: 62; De Vaus, 1986: 154). The format and arrangement



of the questionnaire items related to the logical sequence of the five research questions.

b. The interview schedule:

The interview schedule was intended to supplement and consolidate the data and information obtained from the questionnaire. Twelve follow-up interviews with heads or deputy heads of libraries were carried out. The importance of conducting intensive interviews at some of the libraries was to try and alleviate the disadvantages normally associated with the use of questionnaires. It was also considered that a combination of more than one method in data gathering whereby visits and observation of the IT situation in some libraries were undertaken, could yield more in-depth relevant data and information on the problem. The interview schedule also targeted heads or deputy heads of the concerned libraries to whom in-depth probing could be made and the clarification of issues on the research problem be obtained. Both research instruments were subjected to a “trial run” among professional librarians in order to critically analyze the appropriateness, clarity and conciseness of the items before they were administered.

c. Review and analysis of relevant literature

A review and analysis of literature concerned with sustainability was also undertaken. This intended to explore the main concepts and issues that could be applied in relation to the sustainability of information technology in libraries. Such concepts and issues involved the identification of problems and strategies affecting sustainability. These have featured in the survey and helped the researcher in the fine-tuning of the research instruments.

## **6.1.2 Population of the study**

The determination of the population of the study was based on several criteria. Firstly, the libraries had to be either academic and or research as defined in this study. Secondly, they had to be locally owned and funded by Tanzanian (local) institutions or government departments. Thirdly, they had to be owning and using information technology in the processing; organization and dissemination of information and related services. Based upon these characteristics libraries belonging to foreign-owned institutions like, embassies and

international organizations; and secondary and primary school libraries were excluded from the study. Through the use of various documented sources and consultations with libraries, a total of 18 academic and research libraries were therefore identified as the population of the study. The quality of the questionnaire responses were generally satisfactory, in that all the libraries attempted to respond to almost all the questions. Where some uncertainties remained or the required data was not provided, they were excluded from the survey results and indicated accordingly in the data analysis section.

### **6.1.3 Analysis and presentation of data**

Since the design of the research instruments included mainly many unstructured items, the analysis of data demanded the use of content analysis method to most of the responses obtained through the questionnaire as well as the interview schedule. In other words, most of the items in the instruments were open-ended, necessitating the use of this method in order for the analysis to achieve meaningful and interpretive inferences relevant to the research questions. The few structured items in the questionnaire were coded on the relevant computer coding sheets obtained from the University of Natal Computer Services Division and the analysis done by using **Quattro Pro 6.1** software. The software assisted in computing various descriptive statistical values such as the percentiles and the mean required in the analysis. The presentation of analyzed data involved mainly the use of Tables for which **Word Perfect 6.1** software was used.

In order to provide answers to research question number one, namely the status of information technology in libraries under study, libraries were requested to indicate broadly all IT hardware; software and accessories available in each of the libraries. The identification of IT involved also the categorization of information technology based on their quantity, types of models / makes / brands; and the different versions particularly of software packages available. Tables 5 to 10 summarized this information. Furthermore, the status of information technology also gauged the level of IT skills, knowledge and hence competence, of library staff members. Based upon this data and information; and ideas from the review of literature, it was possible for this study to provide answers for the first research question. The same data

and information, also helped the study to establish a summarized picture of information technology in all the libraries, account for the uneven availability or development of the technology and find reasons for the variety of IT hardware; software and accessories in use among the libraries.

The answers to research question number two of the study were based on the information obtained from the survey. Libraries were provided with five alternative sources of IT funding, and were required to indicate the source of acquisition funds for each IT equipment or accessories (Tables 12 and 13). From the information given, the study was capable of identifying the most used sources in IT acquisitions; actual names of donor organizations from which funds were obtained as well as, the exact number of libraries assisted or supported by each of the donor organizations (Tables 15 and 16). It was also possible to establish factors which influenced donor support among libraries. The same factors also provided explanations for unequal acquisitions as well as uneven development of information technology among the libraries concerned (Table 17).

A combination of ideas from other studies and information from the survey facilitated the answering of research question number three of the study namely, policies affecting the selection and use of the technology among libraries. Libraries were asked to indicate whether they had policies guiding the decision-making processes on IT selection and use. The research question also intended to gauge the extent and level of use of the technology in those libraries.

To response to research question number four of the study, namely what problems were affecting the use and sustainability of information technology in libraries, the relevant responses were basically obtained from three sources. These included: responses from the libraries themselves based on their experiences and the actual daily use of the technology in library environments, ideas and experiences from other studies consulted in the review of literature; and responses from 12 heads and / or deputy heads of some libraries based on the interviews conducted. Data and information obtained from these sources were categorized into three broad categories of problems depending upon the source or origin of the problem

itself (Table 21). From this categorization, the identification of related solutions suggested by the libraries was also facilitated.

Finally, research question number five examined whether libraries had or could think of strategies which could help facilitate the sustainability of information technology in libraries. The answer was based on the responses of libraries and ideas obtained from other studies. In addition, respondents were presented with a list of thirteen conditions or requirements for IT sustainability and then asked to rate or rank those conditions or requirements (from one to 12) based upon how they themselves perceived the importance or effectiveness of each of these conditions or requirements. From the data and information obtained from the research instruments and ideas from other studies, it was possible to come up with several findings in relation to each of the research questions posed by the study, as summarized below.

#### **6.1.4 Summary of the study findings**

The following sub-section summarizes the findings of the study based upon the major research questions which guided the conduct of the study.

##### Summary of findings to research question number one:

The research findings responding to the first research question of the study namely, what is the current status of information technology in libraries under study were that:

1. Generally in all the libraries the status of information technology was still at the initial stages of its development despite the involvement of donors for quite some time. As such, all-round IT infrastructures have not yet fully developed.
2. Among all the libraries and within each library there exist great variations or differences in terms of information technology equipment and related accessories, This resulted in unequal possession and uneven development of the available technology.

3. As a consequence of research findings (1) and (2) above, very low levels of IT connectivity are found in libraries due to lack of important and basic IT accessories.
4. There is a pronounced shortage of IT skills and knowledge among most of the libraries, implying that there are great training needs, as reflected by their own identification of the areas of need.

Summary of findings to research question number two:

Research question two: how was information technology acquired, who financed seed-money for IT equipment and its sustainability? Findings of the study involved the following:

1. The funding and subsequent acquisitions of information technology for the libraries emanated from donors. In most cases, IT was donated as part or supporting technology of other major donor-supported information projects to the libraries or as donations resulting from project proposals written and submitted to donors for assistance or support by the libraries.
2. All the libraries except one had or were obtaining IT support from more than one donor agency or organization. The number of donors assisting a particular library at one given moment had been between two and five donor agencies or organizations.
3. There is an acceptance and recognition of the potential of information technology and hence the need for sustaining it. As such, more than half of the libraries are beginning to allocate part of their annual budgets to the development of information technology although such allocations were still comparatively small in relation to those earmarked for other library resources like books, journals and staff salaries.

Summary of findings to research question number three:

The study findings in relation to research question three namely, what and whose policies were determining the use of available information technology revealed that:

1. The majority of libraries, have no policies whatsoever to guide their selection, use and the overall development of information technology.

2. Despite the fact that some libraries indicated that freedom existed for their managements to make decisions affecting the selection and use of the technology, the influence of donors on these matters was still indirectly and sometimes directly present.
3. The use of the available technology was still mostly restricted to basic and common information services and had not yet involved all areas of library / information services or gone to more advanced uses and applications of the technology like the Internet; World Wide Web (WWW), or local and wide area network (LAN and WAN) connectivity.
4. As a result of the non-availability of some of the basic IT equipment and accessories, limited IT skills, knowledge and competence and the restricted use of the technology in most of the libraries, only a small part of user IT- related information needs was currently being satisfied by the libraries.

Summary of findings to research question number four:

Research question number four inquired about the bottlenecks in the use and sustainability of information technology and how those problems were being or would be solved? Based on the categorization of problems affecting the use and sustainability of information technology, the study findings indicated that:

1. Three categories of problems, that is, technology-, resource- and management-related, were identified as affecting the use and sustainability of information technology in libraries (Table 21). Largely, it is the technology and resource-related problems (the absence and scarcity of resources), which were identified as being the most serious.

Summary of findings to research question number five:

Findings relating to research question number five of the study namely, what strategies were in place or could be put in place in effecting the sustainability of information technology for its long-term use, involved the following:

1. The majority of libraries concurred that the sustainability of information technology in libraries could be possible *only if* concerned libraries implemented concurrently all or the majority of strategies which were proposed in the study (Tables 20 and 22).
2. However, an attitude of apprehension was indicated by most of the libraries with regard to achieving IT sustainability in view of the fact that many of the identified and proposed sustainability strategies were beyond the realm of control of some of the libraries to decide unilaterally on the implementation without involving other management structures, for example parent organization managements.
3. Given the symbiotic relationship existing between the library as an information system and information technology, the attainment of IT sustainability was found to be possible if it was conceived within the sustainability of the entire library / information system. This was indicated as the only rational and appropriate approach through which effective IT sustainability could be guaranteed.

## 6.2 Conclusions

This study explored and investigated the status of information technology and strategies which academic and research libraries in Tanzania can apply and or facilitate the sustainability of information technology currently in use and those to be acquired in future. This becomes a major problem for libraries in view of the fact that many of these technologies have been and are largely being acquired from donor assistance which can end or be withdrawn at any time. It has been emphasized by this and other studies that, unless the problem of information technology sustainability is taken seriously now, and alternative strategies found by the libraries, it will be extremely difficult to sustain the technology and related information services following donor withdrawal or the end of donor-supported IT based projects. The importance of effecting IT sustainability by the libraries draws on the findings of this and other related studies. The conclusions reached in this sub-section, are based on the variables investigated in the research questions and the resulting study findings.

The findings of this study, have established that given the resource constraints facing all the libraries, it was almost impossible for them to purchase or import the technology. As a result, donor assistance seemed to have offered the only alternative for the acquisition of information technology. Despite donor assistance and involvement however, the study has also established that the status of information technology in almost all the libraries studied, has remained very low and inadequate in both quantity and quality of IT equipment and related accessories. Consequently in very many cases, the technology has not been able to respond effectively to user information needs. The probable explanation for this state of affairs has been that the introduction of the technology based largely upon the requirements and choices of the donors at the expense of recipient needs (Kluzer, 1990; Mulira, 1995; Cyamukungu, 1996). Given these observations, it is therefore critical that libraries themselves should become more involved in charting the required path of IT development which could ensure the adequate availability of IT and its effective use and sustainability in order for IT to respond positively to user information needs. The sustainability of information technology is therefore crucial for libraries to ensure that acquired information technology is based upon and satisfies their needs. In view of the research findings of this study and ideas emanating from other studies consulted during the review of related literature on the problem, the following conclusions are therefore made.

### **6.2.1 Status of information technology**

In an attempt to determine the status of information technology in libraries, the findings obtained by this study indicated generally low levels of information technology acquisitions or availability and therefore, uneven IT infrastructural development in most of the libraries. In other words, the overall status of information technology among more than three quarters of the libraries is characterized by some serious shortages or unavailability of all types, in both quantity and quality, of the information technology hardware, software and related accessories. This situation whereby libraries are currently not well endowed with adequate and appropriate information technology hardware, software and IT connectivity is symptomatic of other academic and research libraries especially in developing countries. Studies by Abifarin (1993: 13); Mulira (1995: 96); Chisenga (1995: 22); and Garcha and



Butlar (1996: 33) have confirmed similar findings in libraries in developing countries. From these studies and the current study, one very important observation which emerges is on the similarity of probable factors or explanations which could have been responsible for the poor status of information technology in most of the libraries.

One important explanation for this poor status has been the fact that most of the initiatives by donors to introduce information technology and automation in libraries have been “pilot project computerizations” characterized or supported by “no growth budgets”. As a result, such budgets have not been capable of affording the acquisition of adequate IT equipment and related accessories for the libraries being supported. In other words, donor support for the introduction of information technology in libraries had acted just as a seed-bed for the initiation of computerization which in turn needed further sustained funding from the recipients if the “pilot computerization” projects were to develop beyond the pilot phases. Unfortunately, this fact was never realized by most of the recipient libraries. In order for libraries to attain a high level of IT development which is adequate and appropriate in terms of quantity and quality of equipment and accessories, it can be concluded that it is imperative that the libraries themselves must seek out alternative ways of funding and sustaining the development of the technology through buying extra IT hardware, software and accessories. Resource-generation strategies as proposed in this study can improve the situation if they are effectively and systematically implemented by the libraries.

The fact that libraries have been too much dependent or over-dependent on donors to support and supply them with every IT equipment and accessories, has also led to the current poor status of information technology found in most of the libraries. It has been argued elsewhere in this study that too much dependence on donors stifles one’s own efforts and means towards solving a given problem, and entrenches further (donor) dependence (Mushi and Kjeshus, (1982); and Rosenberg, (1994)). It could be further concluded that most of the libraries in this study have been affected in this way hence, the poor status of IT in these libraries.

## **6.2.2 IT policies and planning**

The absence of IT policies, systematic planning and effective decision-making in relation to library IT needs, provides another explanation for the poor status of IT and also implies bottlenecks that would hinder its effective sustainability. (Mulira, 1995) and Garcha and Buttlar, (1994)). The findings of this study in relation to whether libraries had policies affecting the selection, use and eventual development and sustainability of information technology have indicated that the majority of them (77.78 %) have had no policies whatsoever. Garcha and Buttlar (1994: 26) have confirmed similar findings in their study of 71 academic; research and public libraries in Ghana, Kenya and Nigeria. In the case of this study, the absence of policies in libraries implies that the IT acquisition, use and development including its future sustainability, have never been based on effective planning taking into account the articulated needs of libraries. The lack of such policies in most of the libraries has been attributed to the infant level of technology and strong donor influence on the technology in those libraries. The importance of an information policy and IT policies in particular at institutional level, has also been emphasized in this and other studies. These are critical in facilitating resource-generation, rational resource allocation and charting a planned vision and direction in the development and sustainability of both the library as an information system and its related information technology. It can thus be concluded that the absence of such policies has been denying libraries an important opportunity to formulate a planned path of IT development in terms of its selection, use and future sustainability. There is need therefore for effecting IT policies and management-related strategies so that the development and sustainability of this technology are carried out in a planned and not an ad hoc manner.

## **6.2.3 Levels of information technology use**

Another concluding observation which is equally important affects the use of the technology in relation to its sustainability. It has been emphasized by this study that there is a strong relationship between IT use and its facilitation of IT sustainability. To have sustainable

information technology suited to local needs of information, depends not only upon the relevance and quantity of information, but also on the volume of use. These aspects are critical determinants of the cost-effectiveness of any automated information system. The level of information use in a library contributes or can contribute to IT sustainability. Libraries could ultimately depend on user demand to determine the amount of information they have available, and how relevant it is to the users' needs. It is through this relationship that a sizeable and dependable IT user support group can be created. On such a user group libraries can base their argument for effective support of the technology in terms of the needed resources. The findings on this aspect of IT use in libraries have indicated that given the present low levels of IT availability and connectivity, the level of use of the technology and the varieties of services and products which are generated, are very small, implying that very few user information needs are currently being satisfied. This has a negative bearing on the whole question of IT sustainability in libraries. It is equally concluded that unless the level of availability of information technology resources was increased and adequate and relevant information services and products are generated by the technology, a dependable user group upon which libraries can base their justification for IT's adequate and sustained funding, is unlikely to emerge. The continuous identification of user needs and the tuning of information technology services and products to satisfying those needs is therefore important.

#### **6.2.4 IT education and training**

In addition and related to above-mentioned implication, is the need for IT training among library staff members. It was discussed earlier that effective use of the technology in response to user information needs presupposes having relevant IT skills among library staff members. The findings of the study on the issue have confirmed that generally there are great IT training needs in all the libraries. It has also been indicated by other studies that in most of donor-assisted projects where IT is a part, only 16% of training could be attributed to donors. Despite this fact, it is equally observed that by some of these studies, that training in IT has been neglected by the donors as an area of activity in which to sponsor staff (Baker 1993: 45). In other words, libraries should not depend upon donors to effect the required training and

education in the use of the technology. It is concluded therefore, that training as well as continuous education in information technology are essential if libraries have to guarantee the continuous provision of IT-related information services and products upon which the sustainability of the technology could ultimately depend. Resource-sharing by libraries in IT training and education particularly in Tanzania where training and education facilities are either not available or limited, could facilitate cost-effective methods of acquiring relevant skills and knowledge which are critical in use and sustaining the technology.

### **6.2.5 IT sustainability strategies**

It has also been observed that donor support is now becoming much narrower, piecemeal and limited in terms of areas of information services such support can assist. Hence it is no longer dependable. Continued dependence on donors by the libraries could lead therefore to further decline in the quality and quantity of their information services. To reverse the situation, librarians need to develop a pro-active and self-reliant professional outlook. According to this and other studies these professional attributes have been lacking in many of the libraries. Through this librarians can explore other innovative approaches to developing and sustaining information services other than the current dependence on external support. IT sustainability strategies proposed by the libraries and those identified in the literature can provide a starting point in facilitating not only the sustainability of information technology but also, that of the entire library system. What is lacking in most of the libraries is the will, professional commitment and imaginative outlook among librarians to experiment with new ideas in the improvement for information services (Nawe, 1996:23).

It is therefore important that libraries should not resign themselves to the situation, but be ready to try new ideas. Finally, it is therefore concluded that the successful implementation of the proposed strategies would demand effective planning which entails defined courses of action. This is important because effecting IT sustainability in libraries should be viewed not as a discrete activity, but as a multi-phased and continuous process of implementing all the strategies with each phase complementing and shading into the next.

## 6.3 Recommendations

To achieve objective number five of the study namely, to propose strategies that academic and research libraries in Tanzania can put in place in order to facilitate and achieve the sustainability of information technology, has been treated as part of the recommendations of the study. Proposed strategies imply activities which can be recommended to libraries for implementation in order to facilitate the achievement of IT sustainability. These recommendations are directed specifically to [1] library managements, [2] information professionals, [3] parent institutional managements and [4] donors.

Despite the fact that the findings on research question number five, show that IT sustainability in libraries is feasible, it is also true that information technology is largely undeveloped. This was revealed by the shortages, low performance capabilities of some of the IT equipment, low IT connectivity and inadequate IT skills, knowledge and competence among library staff members. Such status of the technology affects the level and variety of information services generated, which satisfy very small levels of user information needs. It has also been established that lack of IT policies, over-dependence on donors and the poor resource base to support not only IT but other library resources and services in general, have accounted for the poor status, and therefore use, of information technology in libraries. It is thus recommended that:

1. Libraries formulate information (technology) policies, which could facilitate effective strategic planning and development of the technology in terms of acquisitions, use and it's sustainability. It has been reiterated earlier that the absence of policies and strategic management techniques in libraries relating to the overall development of IT had a been one of the major stumbling blocks in laying the foundation of an-round IT infrastructure in most of them. The importance and need for such policies is crucial, in terms of facilitating IT planning, identification of user needs and the generation and allocation of resources in libraries, particularly to the development of information technology and other library services. These policies would reflect the planning processes of libraries indicating their future vision and direction, what they plan to do, how they propose to do it, and the resources needed in

attaining their intended objectives.

2. Libraries identify and regularly conduct assessments of users' IT-related information needs in order to determine the appropriateness of the technology. This would help to subject the acquisition and use of the technology, and the planning of information services in general, to the most important determinant, that is, the user. It should be emphasized that information technology, and information services generally, may only be successfully maintained if they are kept constantly tuned to user or customer requirements. It is also by taking this factor into account that information services and products can successfully generate income for a library within the private sector if they meet customer requirements. Such relationship allows the creation of a sizeable and dependable user support group upon which the libraries can base their lobbying and arguments for effective and adequate funding. Since the value of the information services is assessed by those use and depend on the library, it is important to constantly monitor and satisfy their needs. These users should therefore be active participants in decisions on whether the library's services including information technology, are worthy of continued support and funding.
3. Given that libraries are not independent entities, but part of larger organizations / institutions upon which they depend for their resources and funding, it is critical that they mobilize the support of all stakeholders, particularly the parent organizational / institutional managements. Those bodies' support for libraries has been indicated by the literature to be a crucial and important factor in the overall sustainability of libraries. By sensitizing institutional policy-makers and management on the value and role of information, and ensuring that their information needs are met by the libraries, could facilitate and ensure moral as well as resource support for the library. Rosenberg, (1994:248) for example, argues that University libraries in Africa are not adequately supported by their parent institution managements even when resources are available, because the latter just do not see the need to do so in the view of various competing demands. It is thus possible for libraries to achieve sustainability if they enlist the support, sympathy and commitment of institutional managements. These are the people who influence funding and priority-setting in an institution or organization.

4. Libraries should explore other and diversified sources of generating needed resources to complement those obtained from government. Many of the potential sustainability strategies that have been suggested by the libraries in this study, are mainly concerned with what can be done to generate resources of various types which could facilitate sustainability. Tables 20 and 22 in this study have summarized these important strategies. It is therefore recommended that libraries should attempt to implement strategies in all the three categories, namely resource-generation, policy formulations and planning, and enhancing the role and value of information.
5. It has been emphasized in this study and other studies reviewed that effective management and use of information and information technology requires appropriate IT training and education. The findings of the study confirmed the existence of great training and education needs among all the libraries. It is therefore recommended that libraries should effect IT training and education among their staff members in order to equip them with the required skills and knowledge. These are critical in facilitating effective use and in turn the sustainability of the technology. The kind of training and education required should besides imparting managerial, technical skills and expertise, also be on-going and capable of keeping pace with the rapidly changing information technology. Resource-sharing in training and other IT resources is vital as no library alone can satisfy all its resource needs.
6. It is further suggested that although this study has advocated self-reliance among libraries in developing and sustaining information technology, donor support cannot be ruled out, as it is part of international cooperation. However, some mechanisms should be found by the libraries themselves to ensure that such support does not create a vicious circle of vulnerable dependence by the libraries. One way of doing this is for a library to coordinate and integrate any donor aid or support within its overall development plans as part of additional and not basic resources to the library activities. It is in this sense that such assistance can be effectively used because it would be directed by library managements to actual library development needs.
7. On the part of donors it is recommended that in the process of negotiating support to information services, recipient libraries who are the potential beneficiaries of these projects, should be allowed a greater input in terms of ideas, and actually be included in the choice of projects to be assisted. Through this kind of participation recipients of support can influence decisions

of donors so that projects become compatible with local priorities and can be implemented and sustained within the resources available locally.

8. It is further recommended that donors should review their policies and approaches about the nature and terms of their support. Donor support which is narrower, piece-meal, project-oriented and with limited duration, does not guarantee the future sustainability of information projects in libraries. The kind of support which is therefore recommended should be long-term and multi-purpose, covering several aspects of the library / information services. It should also be flexible, with careful planning towards future sustainability of the intended project (s). This would provide adequate time and experience for the libraries to work out alternative methods of sustaining such projects after donor support ends.

## **6.4 Suggestions for further research**

The findings of this study have contributed to an overall improvement in our understanding of the problem, namely what strategies can academic and research libraries apply in facilitating the sustainability of information technology which has largely been acquired from donor assistance. However, it cannot claim to be definitive as it has been the first study on the problem, particularly in academic and research libraries in Tanzania. Further, it is not known with any certainty which are the best and effective strategies that can bring about IT sustainability in libraries. Most of the proposed strategies towards effecting IT sustainability are potential, and many of them may have not been tried. Hence it is not yet possible to assess their effectiveness. In addition, the problem is still relatively new among most of the libraries, and there is much research work still to be done on how IT sustainability can be facilitated and achieved from within the means or resources and initiatives of libraries themselves. A starting point for further study might therefore be concerned with the following aspects of the problem:

1. Building on this study, there is need for a further study to refine the methodology on identifying factors or strategies which affect the sustainability of information projects like those involving the introduction of information technology (IT) in libraries or information centres. It has been



argued in this and other studies (Valedez and Bamberger, 1994:184) that when the sustainability of any activity or project is not taken care of or is ignored, the life of such activity or project is significantly reduced and the quantity and quality of services provided decline sharply. The importance of refining the methodology on factors likely to affect the sustainability of projects in information systems is therefore critical. This could also help libraries to emphasize the inclusion of those factors or strategies in any future new information projects.

2. Related to the above, it is also important to research strategies and establish a checklist of strategies that may have proven effective in attaining the sustainability of information projects like IT projects in libraries. Much of the review of literature this study has done in relation to this problem, indicates that there are four groups of factors that may affect the sustainability of any activity or project. These include: how the activity or project is designed and implemented; how it is organized; external factors operating at local; national and international levels; the responses of intended and actual beneficiaries to the activity or project. These areas could be a starting point although as they are, they do not identify actual strategies towards sustainability of an activity or a project in the of case of library environments. The identification of proven and effective sustainability strategies suited to library and information services could help libraries to ensure that such strategies are taken care of in designing, planning and implementing of new information projects.
3. While the establishment of a checklist of proven and effective sustainability strategies in library / information environment is important, it should be supported by the constant evaluation of those strategies to determine how effective they are in relation to any specific new information activity or project. This is vital, given that every information project that is established is unique, and libraries operate in different environments. In this exploratory study, the aspect of evaluating the effectiveness of the proposed strategies for IT sustainability was not dealt with, as it is beyond its scope of investigation.
4. Another area of concern, and one which has been emphasized as being crucial for the sustainability of information systems particularly in developing countries, is identifying methods of convincing managements of library parent organizations or institutions of the importance and value of information and

the need for its adequate funding and support. This is one of the most important areas which demands a thorough study. It is assumed that if such managements were fully sensitized and therefore convinced of the value and role information plays in the advancement of an organization, could in turn facilitate effective moral and financial support which are critical to the sustainability of information systems.

5. Finally, a study could be undertaken to determine how to ensure that future donor support in libraries could be more targeted at or ensure that it includes adequate attention to the long-term sustainability of projects supported. To integrate donor support into library / information services without increasing the vulnerability and dependence of libraries is an important area which needs research. As discussed earlier, donor support is likely to continue as part of international cooperation and mutual assistance.

## 6.5 References

- Abifarin, E. P. 1993. Availability and use of information technologies in Nigerian university libraries. *Library review*, vol.42 (5): 4-14.
- Baker, S. 1993. **The survey of information technology in Tanzania**. Dar-es-Salaam: Tanzania Commission for Science and Technology.
- Chisenga, J. 1995. The status of information technology in Zambia. *African journal of library; archive and information studies*, vol.5 (1): 19-24.
- Cyamukungu, M. 1996. Developing strategies for an African computer network (Short communication). *Information technology for development*, vol.7: 91-95.
- De Vaus, D. A. 1986. **Surveys in social research**. London: George Allen and Unwin.
- Garcha, R and L. J. Buttlar. 1996. Profiling African libraries: automation in **Ghana, Kenya and Nigeria**. *Library review*, vol.45 (6): 125-135.
- Kluzer, S. 1990. Computer diffusion in Black Africa; a preliminary assessment. S. B. Bhatnagar and N. Bjorn-Andersen (eds.). Proceedings of the IFIP TC9 / TC8 working conference on: **The impact of information systems on developing countries**, New Delhi, India, 24-26th November. North-Holland, Amsterdam : Elsevier Science publishers. pp.175 - 188.
- Line , M. B. 1982. **Library surveys: an introduction to their uses; planning; procedure and presentation**. London: Bingley.
- Mulira, K. H. 1995. Managing information technology in **Uganda**: strategies and policy formulation. *Information technology for development*, vol.6: 95-105.
- Mushi, S. S. and H. Kjeshus (eds.). 1982. **Aid and development: some Tanzanian experience**. Oslo: Norwegian Institute of International Affairs.
- Nawe, J. 1996. Human resources development and the development of library and information profession in Africa. *African journal of library; archive and information science*, vol.6 (1): 23-30.

Rosenberg, D. 1994. Can libraries in Africa ever be sustainable? *Information development*, vol.10, (4): 247-251.

Valadez, J. and M. Bamberger. 1994. **Monitoring and evaluation of social programs in developing countries.** Washington DC: World Bank.

# BIBLIOGRAPHY

- Abbot, M. A. 1989. **Towards an understanding of the meaning of the word “Use” in the phrase “Use of literature”**. MA, (Unpubl.). Department of Library Science, University of Natal, Pietermaritzburg.
- Abifarin, E. P. 1993. Availability and use of information technologies in Nigerian university libraries. *Library review*, vol.42 (5) : 4-14.
- Adams, R. J. 1989. **Information technology in libraries: a future for academic libraries**. London: Croom Helm.
- African Regional Centre for Technology (ARCT). 1993. **Carnegie Science and Technology Information (STI) for sustainable development in Sub-Saharan Africa: STI projects**. (Report to the Carnegie-funded Sub-Saharan Africa STI projects). Dakar : African Regional Centre for Technology..
- Agha, S. S. 1992. **Sustainability of information systems in developing countries: an appraisal and suggested course of action**. Ottawa: International Development Research Centre (IDRC- Canada. ( Research report commissioned by IDRC) Manuscript No. 316e..
- Agha, S. S. and S. Akhtar. 1992. The responsibility and the response: sustaining information systems in developing countries. *Journal of information science*, vol.18: 283-292.
- Akhtar, S. and K. Melesse. 1994. Africa, information and development: the IDRC’s experience. *Journal of information science*, vol.20 (5): 314-322.
- Amadi, A. 1981. **African libraries- western tradition and colonial brain washing**. Metuchen: Scarecrow.
- Babbie, E. R. 1992. **The practice of social science**. (6th ed.) Belmont, California: Wadsworth.

- Bailey, K. D. 1982. **Methods of social research**. (2nd ed.) New York: Free Press.
- Baker, D. 1992. Resource allocation in University libraries. *Journal of documentation*, vol.48 (1):1-19.
- Baker, S . 1993. **The survey of information technology in Tanzania**. Dar-es-Salaam: Tanzania Commission for Science and Technology (COSTECH).
- Ballantyne, R. 1994. Bridging the gap between practice and policy: policy challenges for agricultural information specialists. *Quarterly bulletin of the international association of agricultural and information specialists*, vol.19 (1-2): 24-29.
- Balian, E. S. 1982. **How to design, analyze and write doctoral research: the practical guidebook**. Lanham: Univ. Press of America.
- Bean, G. J. P. 1994. **Foreign aid and development in South Africa: four illustrative case studies**. M.A. Thesis; (Unpubl.). Department of Political Studies, University of Natal, Pietermaritzburg.
- Bartz, B. H. Opitz and E. Richter (eds.) **World guide to libraries; handbook of international documentation and information**, Vol 8. Munche : K.G. Saur.
- Belerson, B. 1954. Content analysis. In: G. Lindzey (*ed.*), **Handbook of social psychology; theory and methodology**. (vol. One). Cambridge, Mass.: Addison-Wesley.
- Bender, D. R. 1993. A strategy for international information policy. *Libri*, vol.43 (3): 210-231.
- Bossert, T. J. 1990. Can they get along with us? The sustainability of donor-funded health projects in Africa and Central America. *Social science and medicine*, vol.30 (9): 1015-1023.
- Busha, C. H. and S. P. Harter . 1980. **Research in librarianship: techniques and interpretation**. New York: Academic Press.

- Business international*. 1988 / 1990. Aid, finance up-date: Africa (March, 1988 and July, 1990).
- Brinkerhoff, D. W. and A. A. Goldsmith. 1992. Promoting the sustainability of development institutions: a framework for strategy. *World development*, vol.20 (3): 369-383.
- Camara, A. B. 1988. Implementing the information strategy for Africa: the first stages. *Information development*, vol.6 (1): 55-61.
- Cernea, M. M. 1987. Farmers organizations and institution building for sustainable development. *Regional development dialogue*, vol.8 (2): 1-19.
- Chisenga, J. 1995. The status of information technology in Zambia. *African journal of library; archive and information science*, vol.5 (1): 19-24.
- Cole, S. 1986. The global impact of information technology. *World development*, vol.14 (10 /11): 1272-1292.
- Coombs, P. H. 1985. **The world crisis in education**. Oxford: Oxford Univ. Press.
- Cyamukungu, M. 1996. Developing strategies for an African computer network (short communication). *Information technology for development*, vol.7: 91-95.
- De Vaus, D. A. 1986. **Surveys in social research**. London: George Allen and Unwin.
- Durrani, S. 1987. Agricultural information services in Kenya and the third world. *Journal of librarianship*, vol.19 (2): 108-119.
- Dovers, S. 1989. Sustainability, definitions, clarification and context. *Development; journal of the society for international development*, vol.2 / 3: 33-36.
- Edwards, A. and R. Talbot. 1994. **The hard-pressed researcher: a research handbook for the caring professions**. London: Longman.

- Farrel, D. 1979. Do Multinational corporations really transfer technology? K. R. Brown (ed.) **Integration of science and technology with development**. New York: Pergamon.
- Freudenberg, K. 1994. New technology for rural women: paradoxes of sustainability. *Development in practice*, vol.4 (1): 13-22.
- Garcha, R. and L. J. Buttlar. 1996. Profiling African libraries: automation in **Ghana, Kenya and Nigeria**. *Library review*, vol.45 (6): 125-35.
- Gavin, T. J. 1985. Beyond survival: library management for the future. B. P. Lynch, (ed.) **Management strategies for libraries**. New York: Neal-Schuman.
- Hall, B. M. 1990. Information technology and global learning for sustainable development: problems and prospects. *Alternatives*, vol.19: 99-132.
- Holsti, O .R. 1969. **Content analysis for the social sciences and humanities**. Reading, Mass.: Addison-Wesley.
- Hotelling, C. 1931. The economics of exhaustible resources. *Journal of political economy*, vol.39: 137-175.
- International Development Research Centre (IDRC). 1989. **Sharing knowledge for IDRC's information strategy for Africa**. Ottawa: International Development Research Centre. (Technical study 64 e, f).
- International Union for the Conservation of Nature and Natural Resources (IUCN). 1987. **World Conservation strategy**. Gland, Switzerland.
- Jinabhai, C. C. 1995. Contribution of external aid agencies to the social sector: lessons for South Africa. *Development southern Africa*, vol.12 (1): 97-112.
- Kanamugire, A. 1995. Partners in developing CD-ROM services for developing countries. *Libri*, vol. 45: 106-112.



- Kerlinger, F. N. 1973. **Foundations of behavioural research**. (2nd ed.). New York: Holt Rinehalt.
- Kibirige, H. M. 1992. Information technology transfer to developing countries: problems and prospects for the 1990s. Proceedings of the conference on: **Library and information services for future development of Southern Africa**, 6- 8th May, Pretoria, South Africa, edited by A.G. Coetzer, Pretoria: Info Africa Nova CC. Pp 536-549.
- Kidder, L. H., C.; M. Judd and E. R. Smith. 1986. **Research methods in social relations**. (5th ed.), New York: Holt Rinehalt and Winston.
- Kluzer, S. 1990. Computer diffusion in Black Africa- a preliminary assessment. Proceedings of the IFIP / TC9 / TC 8 working conference on: **The impact of information systems on developing countries**. New Delhi, India, 24- 26th, Nov. 1988, edited by B. Bhatnagar and N. Bjorn Andersen. North-Holland, Amsterdam : Elsevier Science Publishers B.V. Pp 175-188.
- Krippendorff, K. 1980. **Content analysis: an introduction to its methodology**. Beverly Hills: Sage publications.
- Leedy, P. D. 1980. **Practical research: planning and design**. New York: Macmillan.
- Levey, L. 1991 **Computer and CD-ROM capability in Sub-Saharan African university and research libraries**. Washington, DC : American Association for the Advancement of Science.
- Levey, L. 1992. **CD-ROM for African research needs: basic guidelines**. Washington: American Association for the Advancement of Science.
- Levey, L. 1993. **A profile of research libraries in Sub-Saharan Africa**. Washington, DC : American Association for the Advancement of Science..
- Lindner, W. 1987. Editorial (Guest editor). *Development*; vol.2 (2 / 3): 2.

- Line, M. B. 1982. **Library surveys: an introduction to their uses; planning; procedure and presentation.** London: Bingley.
- Line, M. B. 1986. The survival of academic libraries in hard times: reactions to pressure, rational and irrational. *British journal of academic librarianship*, vol.1 (1): 1-17.
- Lishan, A. 1993. Sustaining academic networks in Africa: a systems operator's perspectives. In: **Electronic networking for West African universities.** (Report from a Workshop) Accra, **Ghana.** Washington, DC : American Association for the Advancement of Science. pp 13-26.
- Mangheni, P. J. 1993. The role of information technology in African development strategy: prospects for IT applications in Africa. *African techno-development bulletin*, vol.12: 1-17.
- Mchombu, K. and K. Miti. 1992. Formulation of national information policies for Africa: some unlearnt lessons. *International information and library review*, vol.24: 137-171.
- Mgaya, K. 1994. Development of information technology in **Tanzania.** In: E.P. Drew and G.F.Foster, (eds.) **Information technology in selected developing countries..** Tokyo: United Nations University.
- Mhina, M. H. 1995. **Factors affecting the introduction of information technology at the Institute of Finance Management (IFM) library.** MA (Unpubl.), Dept of Information Science, University of Sheffield, Sheffield.
- Mlambo, A. S. 1993. "The rich shall inherit the earth": towards the role of IMF Structural Adjustment Programmes in Sub-Saharan Africa. *Zambezia; journal of the University of Zimbabwe*, vol.20 (1): 53-76.
- Moahi, K. 1996. Training of African librarians for the new information age: progress in **Botswana.** *Information development*, vol.12 (2): 91-95.
- Moore, C. and E. Newbigging. 1983. The UK Overseas Development Administration and non-departmental public bodies in the field of education aid. *Public administration and development*, vol.2: 31-43.

- Morss, E. R. 1984. Institutional destruction resulting from donor and project proliferation in Sub-Saharan Africa. *World development*, vol.12 (4): 465- 470.
- Mulira, K. H. 1995. Managing information technology in **Uganda**: strategies and policy formulation. *Information technology for development*, vol.6: 95-105.
- Mushi, S. S. and H. Kjeshus (eds.) 1982. **Aid and development: some Tanzanian experience**. Oslo: Norwegian Institute of International Affairs.
- Nawe, J. 1996. Human resource development and the development of library and information profession in Africa. *African journal of library; archive and information science*, vol.6 (1): 23-30.
- Newa, J. M. 1993. The sustainability of information technology innovations; CD-ROM technology at the University of Dar-es-Salaam. Proceedings of the workshop on: **Survival strategies in African university libraries: CD-ROM in technology in the service of information**. Organized by the University of Zimbabwe / American Association for the Advancement of Science, Harare, Zimbabwe, 2-5th May. Pp. 23-30.
- Pan-African Development and Information Systems (PADIS). 1994. Concepts and working definitions. Training workshop for **University lecturers teaching library and information science in African universities and institutions of higher learning**. Gaborone: Botswana, 5-12th, December.
- Pimienta, L. 1993. Research networks in Developing countries: not exactly the same story. Proceedings of the i.NET'93; INTERNET Society, 1993: 1.- 15.
- Powell, R. R. 1991. **Basic research methods for librarians**. Norwood, New Jersey: Ablex.
- Priestley, C. 1991. Higher education resource materials. *Zimbabwe librarian*, vol.22 (1-2): 16-27.

- Priestley, C. 1993. **SAREC library support programme; evaluation and review: Ethiopia, Mozambique and Tanzania**. Stockholm: Swedish Agency for Research Cooperation with developing countries / Gotab. (SAREC Documentation. series;1993:1).
- Priestley, C. 1996. Donor policies and practice. In D. Rosenberg, **University libraries in Africa; a review of their current state and future potential**. Vol.2: case studies. London: International African Institute.
- Prytherch, R. J. 1995. **Harrod's librarian glossary**. Aldershot: Gower.
- Rebredo, J., T. M. Botelho and M. B. da Cunha. 1991. Some problems involved in the installation of advanced information systems in developing countries. *Resource sharing and networks*, vol.6 (2):81-95.
- Robinson, N. A. 1993. The factors involved in creating a sustainable academic / research networks in Zambia.**Electronic networking in Zambia**. (Report of a Workshop). Accra, Ghana, 15-17th, Dec. 1993. Washington, DC : American Association for the Advancement Science.. Pp: 43-74.
- Rondinelli, D. 1986. **Development management in Africa; experience with implementing agricultural development projects** . Washington, DC : USAID. (AID special evaluation study, No. 44).
- Rosenberg, D. 1992. Resources-sharing is it the answer? **National information services and information resources sharing and networking**. Follow-up and evaluation Seminar. Nairobi, Kenya.26-31, October. Pp 274 - 251..
- Rosenberg, D. 1994. Can libraries in Africa ever be sustainable? *Information development*, vol.10 (4): 247-251.
- Rosenberg, D. 1996. **University libraries in Africa; a review of their current state and their future potential**. (3 volumes). London: International African Institute.
- Schware, R and Z. Choudhury. 1988. Aid agencies and information technology development. *Information technology development*, vol.3 (2): 145-158.

- Sellitz, C.; L. J. Wrightman and S. W. Cook 1976. **Research methods in social relations**. (3rd ed.). New York : Holt, Rinehalt and Winston.
- Sheya, M. S. and G. R. Koda. 1988. The state of informatics in **Tanzania**. In: Tanzania. Ministry of Finance, Economic Affairs and Planning, Seminar on: **The contribution of informatics to economic development**. Arusha, Tanzania, 10 - 12th August, 1988. Arusha International Conference Centre (AICC). (Official report).
- Sisaye, S. 1982. Swedish development aid policy; a discussion with reference to **Ethiopia**. *Public administration and development*, vol.2 (2): 147-167.
- Simpson, J. A and E. S. C. Wiener. 1989. **The Oxford English dictionary**. (2nd ed..) Oxford : Clarendo Press.
- Sproull, N. L. 1995. **Handbook of research methods; guide for practitioners and students in the social sciences**. (2nd ed.). Metuchen, New Jersey: Scarecrow.
- Stefanini, A. 1995. Sustainability the role of **NGOs**. *World health forum*, vol.16: 42-46.
- Stephen, P. and S. Hornby. 1996. **Simple statistics for librarians and information professionals**. London: Library Association.
- Strauss, A. L. and J. Corbin. 1990. **Basics of qualitative research: grounded theory procedures and techniques**. Newbury Park, California: Sage Publications.
- Tanzania, Ministry of Planning and Economic Affairs. 1985. **Science and technology policy for Tanzania**. Dar-es-Salaam : Ministry of planning and Economic Affairs.
- Tanzania. 1986. **The Tanzania Commission for Science and Technology Parliamentary Act No. 7 of 1986**. Dar-es-Salaam : Government Printer. 19pp.
- Thompson, P. 1993. Building sustainability into agricultural information projects in small developing countries. *International association of agricultural librarians and documentalists quarterly bulletin*, vol.38 (2-3): 75-77.

Valadez, J. and Bamberger, M. 1994. **Monitoring and evaluation of social programs in developing countries.** Washington, DC: World Bank.

Van Maanen, J.; J. M. Dabbs and Faulkner, R. 1982. **Varieties of qualitative research.** Beverly Hills: Sage Publications.

Watson, K. 1993. Changing emphases in educational aid. *Comparative education*, vol. 36 : 59 - 84.

World Commission on Environment and Development (WCED). 1987. **Our common future.** Oxford : Oxford University Press.

Zulu, S.F.C. 1994. Africa's survival plan for meeting the challenge of information technology in the 1990s and beyond. *Libri*, vol. 44 (1): 77-94.

# APPENDICES

## APPENDIX A

### LETTERS OF INTRODUCTION

- A1 Letter from the Head of Department of Information Studies, University of Natal ..... 192**
  
- A2 Letter from the Vice Chancellor, University of Dar-es-Salaam ..... 193**
  
- A3 Proforma letter from researcher ..... 194**

**A1 Letter from the Head of Department of Information Studies, University of Natal**





## Information Studies

Private Bag X01 Scottsville  
Pietermaritzburg 3209 South Africa  
Telephone (0331) 2605007 Fax (0331) 2605092  
Telegrams University Telex 643719  
E-Mail Holtz @ info.unp.ac.za

22 May 1996

TO WHOM IT MAY CONCERN

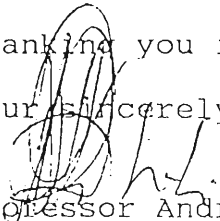
RE: INTRODUCTION OF MR. D. KATUNDU

This is to introduce Mr. Desdery Katundu. He is a PhD candidate in Information Studies at the University of Natal, Pietermaritzburg, South Africa. Mr. Katundu is an employee of the University of Dar es salaam Library, but currently on study leave.

He is in the country to conduct research for his doctoral studies. His research is on the *Use and sustainability of information technology in academic and research libraries in Tanzania*. I would be most grateful if you can assist him in any way you can with respect to his collection of data for the research

Thanking you in anticipation.

Your sincerely,

  
Professor Andrew M. Kaniki  
HOD, Information Studies Dept.

## **A2 Letter from the Vice Chancellor, University of Dar-es-Salaam**

# UNIVERSITY OF DAR ES SALAAM

OFFICE OF THE VICE-CHANCELLOR

P.O. BOX 35091 ● DAR ES SALAAM ● TANZANIA

Telephone: 43500-9 Ext. 2001, Direct 46841

Telex:

41561 UNIVIP

41327 UNISCIE

41854 UNENG TZ



E-Mail:vc@udsmucc.gn.apc.org.

Telefax: 43078/43023

Telegrams:

UNIVERSITY DAR ES SALAAM

Ref.: AB3/3 (B)

21st June, 1996

TO WHOM IT MAY CONCERN

## UNIVERSITY STAFF AND STUDENTS RESEARCH CLEARANCE

The purpose of this letter is to introduce to you Mr. D.R.M. Katundu who is a bonafide academic member of staff of the University of Dar es Salaam. Mr. Katundu is at the moment conducting his doctoral research titled "The use and sustainability of information technology in academic and research libraries".

In accordance with a government circular letter Ref. No. MPEC/R10/1 dated 4th July, 1980 the Vice-Chancellor was empowered to issue research clearances to the staff and students of the University of Dar es Salaam on behalf of the Government and the Tanzania Commission for Science and Technology.

I therefore request you to grant the above mentioned member of our University community any help that may facilitate him to achieve research objectives. What is required is your permission for him to see and talk to the leaders and members of your institutions in connection with his research.

The period which this permission has been granted is from June, 1996 to December, 1996.

In case you may require further information please contact the Research and Publications Office, Tel. 43500 Ext. 2021.

Prof. M.L. Luhanga  
VICE-CHANCELLOR

VICE CHANCELLOR  
UNIVERSITY OF DAR ES SALAAM  
P. O. BOX 35091

### **A3 Proforma letter from the researcher**

# UNIVERSITY OF DAR ES SALAAM

## THE LIBRARY

P.O. Box 35092 Dar es Salaam Tanzania

Telephone No. 43500/8 Ext. 2165

Direct:43241

E-Mail: Lib@unidar.gn.apc.org

Reference@unidar.gn.apc.org

Telegrams: UNIVERSITY

DAR ES SALAAM

TANZANIA

Fax: 255 51 43241 or 112754



Our Ref: C550

Your Ref:

Sir,

Re: REQUEST FOR INFORMATION/DATA ON INFORMATION TECHNOLOGY

As letters of introduction indicate I am a Ph.D student at the University of Natal (SA) in the Department of Information Studies. Currently I am conducting research in order to gather relevant information and data pertaining to my research topic: The Use and sustainability of Information Technology in academic and research libraries in Tanzania. Your Institute is one of the subjects due to being both an academic and research institution. I am also informed of your institution having Information Technologies acquired through a variety of ways. I would therefore kindly request for assistance by filling in the attached questionnaire which could be returned to me in the self-addressed envelope (enclosed).

I also do hope to visit your institute to find out more through the Interviews as per attached schedule.

I will appreciate your kind assistance in this.

Thanking you in advance.

Yours sincerely,

D.R.M. Katundu.

**APPENDIX B**  
**RESEARCH INSTRUMENTS**

<b>B1</b>	<b>Survey questionnaire</b>	<b>196</b>
<b>B2</b>	<b>Interview schedule</b>	<b>209</b>

## **SURVEY QUESTIONNAIRE**

### **The use and sustainability of information technologies (IT) in academic and research libraries in Tanzania.**

#### **Introduction**

Your cooperation is kindly requested in filling in this Questionnaire in order to obtain relevant information for this research topic. This survey is part of my research as a student registered with the Department of Information Studies, University of Natal, South Africa. Be as frank as possible in your responses in order to assist me arrive at useful conclusions and recommendations to our information systems. Confidentiality of information provided, together with names of individuals and organizations will be respected. Any other vital information which you may think would be useful to this study will be highly appreciated if it accompanies the completed questionnaire.

**SURVEY QUESTIONNAIRE**

**THE USE AND SUSTAINABILITY OF INFORMATION TECHNOLOGIES  
(IT) IN ACADEMIC AND RESEARCH LIBRARIES IN TANZANIA.**

**Please try to answer all questions and be as complete as possible.**

- 1) Please indicate the nature of your library:  
(e.g. research/educational/commercial/financial/legal/agricultural/environmental, etc.)

.....  
.....

- 2) Approximately what is the total number of registered users currently being served by your library?

.....  
.....

- 3) List the types of users served by your library:  
(e.g. students/academics/researchers/policy-makers/farmers/businessmen, etc.)

.....  
.....  
.....  
.....

**Information Technology (IT )**

Includes the machinery and equipment (e.g. computers; printers); software and programs; as well as manuals; and procedures for producing and disseminating data and information electronically, that is by means of tele-communications .

In this connection, please supply information on each type of information technology your library has:

- 4) **Computers:**

- 4a) What is the total number of computers available (Include stand-alone and dumb terminals)

.....

- 4b) List their models / brands or makes (e.g. IBM ; Olivetti; Compaq; etc.)

.....  
.....  
.....  
.....



- 4c) Please indicate the total number of computers acquired in each of the following periods.
- a) 1976 - 1980 .....
  - b) 1981 - 1985 .....
  - c) 1986 - 1990 .....
  - d) 1991 - 1995 .....
- 5) How were the computers acquired? Please indicate by ticking the appropriate.
- a) Through donor grant only .....
  - b) Purchased from own funds only .....
  - c) Through both donor grant and own funds .....
  - d) Any other (please specify) .....
- .....
- .....
- .....
- .....
- .....
- 6) In case the answer to Question 5 is (c) who contributed the largest amount of funds for the purchase of your computers?
- a) Mainly donors .....
  - b) Mainly funds from own budget .....
  - c) Both donor's and own funds were equal .....
  - d) I do not know .....
- 7) Printers:
- 7a) Total number of Printers you have .....
- 7b) List their models/brands or makes .....
- .....
- .....
- .....
- 7c) Please indicate the total number of Printers acquired in each of the of the following periods
- a) 1976 - 1980 .....
  - b) 1981 - 1985 .....
  - c) 1986 - 1990 .....
  - d) 1991 - 1995 .....
- 8) How were the Printers acquired? Indicate by ticking the appropriate.
- a) Through donor grant only .....
  - b) Purchased from own funds only .....
  - c) Any other (please specify) .....
- .....

.....  
9) CD- ROM Drives/Players.

9a) What is the total number of CD-ROM drives/players you have. (Count as individual CD-ROM drives those that are in-built that is, those found in the computer itself.  
.....  
.....  
.....

9b) List their Brands or makes (e.g. Hitachi; Sony; etc.)  
.....  
.....  
.....

10) How were the CD-ROM drives/players acquired? Indicate by ticking the appropriate.

- a) Through donor grant only .....
  - b) Purchased from own funds only .....
  - c) Through both donor and own funds .....
  - d) Any other (please specify) .....
- .....  
.....  
.....

11) Systems (or Operating) softwares.

These are Softwares used to operate or initiate the functioning of the computers, e.g. MS -DOS; Windows; etc .

List the types of Systems softwares you have.

- a) .....
- b) .....
- c) .....
- d) .....
- e) .....
- f) .....

12) How were Systems softwares acquired? Indicate by ticking the appropriate.

- a) Through donor grant only .....
- b) Purchased from own funds only .....
- c) Through both donor and own funds .....
- d) Any other (please specify) .....

13) Applications softwares:

These are software that allow you to perform certain functions or activities with the use of the Computer, e.g. Word-Perfect for word-processing; Dbase; CDS / ISIS; etc.

List the Names of Applications softwares you have.

- a)
- b) .....
- c) .....
- d) .....
- e) .....
- f) .....

14) How were Applications softwares acquired? Indicate by ticking the appropriate.

- a) Through donor funds only .....
  - b) Purchased from own funds only .....
  - c) Through both donor and own funds .....
  - d) Any other (Please specify) .....
- .....
- .....
- .....

CD- ROM Databases:

15) List the CD-ROM Databases your library has been receiving or subscribing to for the past three years: (from 1994 - to present (1996).

- a)
- b) .....
- c) .....
- d) .....
- e) .....
- f) .....

16) How were (are) CD- ROM Databases being acquired or subscribed to? Please tick the appropriate.

- a) Through donor grants only .....
  - b) Through own funds only .....
  - c) Through both donor and own funds .....
  - d) Any other (Please specify) .....
- .....
- .....
- .....

- 17) Please tick what else your library has from the following types of Information technologies:
- a) Modem .....
  - b) Fax .....
  - c) Telephone .....
  - d) Any other (Please specify) .....
- .....
- .....
- .....

- 18) Does your library prepare an Annual Budget? Please tick the appropriate.
- a) YES .....
  - b) NO .....

If NO Please give reasons

.....

.....

.....

.....

.....

- 19) Approximately what percentage of your approved Annual budget is used for:
- a) Staff remuneration (salaries; etc.) ..... %
  - b) Books and journal purchases ..... %
  - c) Human resources development ..... %
  - d) Information Technologies ..... %

- 20) In your opinion do you think the approved Annual budget used for (d) in Question 19 above is sufficient?
- YES .....
  - NO .....

If YES please give reasons

.....

.....

.....

.....

.....

If NO please give reasons

.....

.....

.....

.....

.....

21) Please list the Names of donors you can remember who have assisted your library (either, financially or otherwise) in acquiring Information technology equipment.

.....  
.....  
.....  
.....  
.....  
.....

22) In the following please indicate factors which you think influence donor support in information technology to your library. (You may tick more than one factors if necessary).

- a) Donor assistance in Information technology come as part of other projects to be implemented by the library .....
- b) The library submits its own project proposals to donors for assistance in getting Information technology .....
- c) Information technology equipment come to the library as an unsolicited gift or donation .....
- d) sometimes donors have projects of their own (not related to the library) whereby the library is requested to cooperate because those donor projects deal with the information component .....
- e) The library provided premises / space to information technology belonging to the library's parent institution .....

23) Are there any other factors (not mentioned in Question 22 above) you can think of which influence donor support to your library?

.....  
.....  
.....  
.....  
.....  
.....

24) Among the above-mentioned factors in Questions 22 and 23 which factors do you think have been prominent in influencing donor support to your library?

.....  
.....  
.....  
.....  
.....  
.....

- 25) Does your library have a policy on:
- a) how to select the Information technologies you need to acquire?
    - YES .....
    - NO .....
  - b) how the Information technologies you have are to be used for?
    - YES .....
    - NO .....

26) How does the absence of policy in Question 25 (a and b) affect your library in the selection and use of Information technologies?

.....

.....

.....

.....

.....

.....

.....

27) Please tick the functions or activities for which your Information technology is used. (You may indicate several functions if necessary ).

- c) Word-processing
- d) On-line and document delivery
- e) Database creation and management
- f) Literature searches services
- g) Desk-top Publishing
- h) Networking
- i) Union listing of periodicals
- j) Electronic communication, (e.g. E-Mailing)
- k) Library House-keeping functions- cataloguing; circulation; etc
- l) Any other functions: (Please specify)

.....

.....

.....

.....

.....

.....

.....

28) Who determines what functions / activities the Information technology you have is to be used for in your library?

- a) Library management only
- b) Donors of Information technology (IT) to the library
- c) Library managements and donors of IT together
- d) Any Other (please specify)

.....  
.....  
.....  
.....  
.....

29) Do you have a process of determining or finding out what the needs of your users are to services and products generated by the Information technology your library has?

- YES .....
- NO .....

IF the answer to Question 29 above is YES what methods do you use to determine the needs of your users for services and products generated by the Information technology your library has? List them.

.....  
.....  
.....  
.....  
.....  
.....  
.....

IF the answer to Question 29 above is NO how do you determine your users' needs to services and products generated by the Information technology you have? ( Please explain).

.....  
.....  
.....  
.....  
.....  
.....  
.....





IF the answer to question 32 is NO please give reasons.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

33) List ways, means or strategies you have found (or you think) to be useful and capable of assisting your library to acquire, maintain and continue to use your Information technology over a long-term without donor support (or when donor grants run out).

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

34) Please list the problems your library faces in acquiring, maintaining, and for continued use of Information technologies your library has.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

35) How is your library trying to overcome or solve those problems mentioned in Question 34 above?

.....

.....

.....

.....

.....

.....

.....

36) Listed below are the basic conditions or requirements which could be necessary for continued acquisition, maintenance, and continued use over a long-term of the information technologies your library has or would be acquiring.

Please rate the following basic conditions or requirements in the order of importance from 1 to 13, with 1 being the most important and 13 being the least important.

<u>Conditions or Requirements</u>	<u>Rating</u>
Enhancing the value of information .....	
Application of good management skills and practice .....	
Knowledge of users; their needs and tailoring (IT) information services to those needs .....	
Support from parent organization to the library .....	
Support from users .....	
Human resources development .....	
Mobilization and optimum use of resources .....	
Minimizing dependence over donors .....	
Promotion and marketing of IT information services and products .....	
Generating income and effecting cost recovery measures .....	
Adoption of enabling policies in the use of IT .....	
Resource sharing measures - locally; nationally; and internationally .....	
Having financial sustainability .....	

37) Can you think of any other basic conditions/requirements not mentioned in Question 36 above?

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**General comments on the sustainability of information technology (IT).**

38) Do you have any additional suggestions or comments on methods or strategies you may consider could be successful in achieving the sustainability of Information technologies in libraries in Tanzania following withdrawal of donor support?

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Thanking you for your time and patience.

Please Mail to: Desdery R.M. KATUNDU  
LIBRARY  
UNIVERSITY OF DAR -ES-SALAAM  
P.O. BOX 35092  
DAR-ES-SALAAM

## **INTERVIEW SCHEDULE**

### **USE AND SUSTAINABILITY OF INFORMATION TECHNOLOGY (IT) IN ACADEMIC AND RESEARCH LIBRARIES IN TANZANIA.**

(For Heads of libraries)

#### **Introduction**

The purpose of this interview is to supplement the questionnaire in gathering data and information for the above-mentioned research. The questions therefore aim at gathering in-depth general information pertaining to the research questions guiding the conduct of the study.

#### **Interview Questions**

1. From available literature it is argued that the acquisition of information technology in most of the academic and research libraries seems to have been forced upon you by the donors before your library had evolved realistic IT plans and actually automated. As a result, available IT is scanty, incapable of providing all-round IT services to users, and having no well thought strategies for its eventual acquisition, updating, maintenance and sustainability. What are your comments on this allegation?
2. Given a whole range of problems affecting libraries in Tanzania in terms of new acquisitions, inadequate budgetary provisions, poorly paid staff, inadequate parent organization support and the like, is there any possibility for your library to afford the future acquisition, maintenance, updating, and sustainability of information technology you currently use or would be acquiring without donor support?
3. What practical ways or strategies your library is or thinking of employing to attain the long-term acquisition, maintenance and sustainability of information technology you have now and in the future?

4. What problems do you face in the use and sustainability of your information technology?
5. What role do you think should be played by your parent organization, the Tanzania Commission for Science and Technology and the Government in ensuring that information technology in Tanzania is sustainable? How can these organs assist IT sustainability?
6. Do you have any other comments or suggestions pertaining to the overall issue of the sustainability of information technology and its overall development in academic and research libraries in Tanzania?

## APPENDIX C

# ADDRESSES OF LIBRARIES

<b>C1</b>	<b>Addresses of libraries involved in the study .....</b>	<b>212</b>
-----------	---	------------

## **C1            Addresses of libraries involved in the study**

1.        University of Dar-es-Salaam library (**UDSM**)  
P.O. Box 35092, Dar-es-Salaam.
2.        Tanzania Industrial Research Organization (**TIRDO**)  
P.O.Box 23235, Dar-es-Salaam
3.        Tanzania Commission for Science and Technology (**COSTECH**)  
P.O.Box 4302, Dar-es-Salaam
4.        Univ. College of Lands & Architectural Studies (**UCLAS**)  
P.O. Box 35176, Dar-es-Salaam
5.        Institute of Marine Sciences (**IMS**)  
P.O.Box 668, Zanzibar.
6.        Institute of Accountancy, Arusha (**IAA**)  
P.O.Box 2798, Arusha.
7.        Muhimbili University College of Health Sciences (**MUCHS**)  
P.O. Box 65012, Dar-es-Salaam.
8.        Sokoine University of Agriculture (**SUA**)  
P.O.Box 3022, Morogoro.
9.        Eastern, Central & Southern Africa Management Institute (**ESAMI**)  
P.O. Box 3030, Njiro Hill, Arusha.
10.      Cooperative College Moshi ( **CCLM**)  
P.O. Box 474, Moshi.
11.      College of African Wildlife Management (**CAWM**)  
P.O.Box 3031, Moshi.
12.      School of Library; Archive & Documentation Studies (**SLADS**).  
P.O. Box 227, Bagamoyo.
13.      Ministry of Agriculture, Head quarter library (**Min. Agr. H/Q**)  
P.O. Box 2066, Dar-es-Salaam
14.      Tanzania Gender Networking Programme (**TGNP**)  
P.O. Box 892, Dar-es-Salaam
15.      Rwegalurila Water Resources Institute (**RWRI**)  
P.O.Box 35059, Dar-es-Salaam.
16.      National Environmental Management Council library (**NEMC**)  
P.O.Box 20671, Dar-es-Salaam.
17.      Economic & Social Foundation Research (**ESFR**)  
P.O. Box 31226, Dar-es-Salaam
18.      Tanzania Food and Nutrition Centre (**TFNC**)  
P.O. Box 977, Dar-es-Salaam.