ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

SCHOOL OF INFORMATION STUDIES FOR AFRICA

EVALUATION OF INFORMATION PRODUCTS AND SERVICES OF THE DOCUMENTATION AND INFORMATION CENTRE KHARTOUM, SUDAN

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF SCIENCE IN INFORMATION SCIENCE

BY

RAFAA ASHAMALLAH GHOBRIAL

JUNE 1992

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DECLARATION

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

Rafaa

(signed)

Rafaa Ashamallah Ghobrial

19 May 1992

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

(signed)

A. Neelagmeghan

19 May 1992

Dedicated to my parents

ASHAMALLAH & FAHIMA

and my sisters

LYLA, HUDA & TERZA

to whom I owe my education

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ABSTRACT

The Documentation and Information Centre (DIC) was set up in 1978 as part of the National Centre for Research in Khartoum, Sudan, to support research, development planning, decision making and projects monitoring and evaluation. For the efficient and effective discharge of its functions and responsibilities. DIC has developed a library and information centre and has been providing a variety of information products and services. This study aims to evaluate the products and services of DIC, mainly the databases, abstracting services, and the inventories and resource sharing activities. The study attempts to identify through systems analysis, surveys and discussions, factors affecting the utilization of DIC products and services. Following a brief general description of the geographical, political and economic features, natural resources, research and development, information infrastructure and its inadequacies are detailed. User evaluation shows that DIC products and services are generally of a high quality in contents but needs improvement of the printing and get up. The information products are found useful to build up information sources and in identifying of grey literature. Users' preferences in terms of services was as follows: literature search (22.29%), Article photocopy (18.60 %), bibliographies (15.12%), SDI

(10.49%), fiche copy and paper (9.30%). Useful suggestions have been received from users and information scientists which would help improve the services.

Various factors affecting the smooth operation of DIC are discussed and suggestions are given for developing an integrated management information system to support decision making, research and development. Further recommends that DIC should assume responsibilities as the central body for coordinating information services and activities in Sudan.


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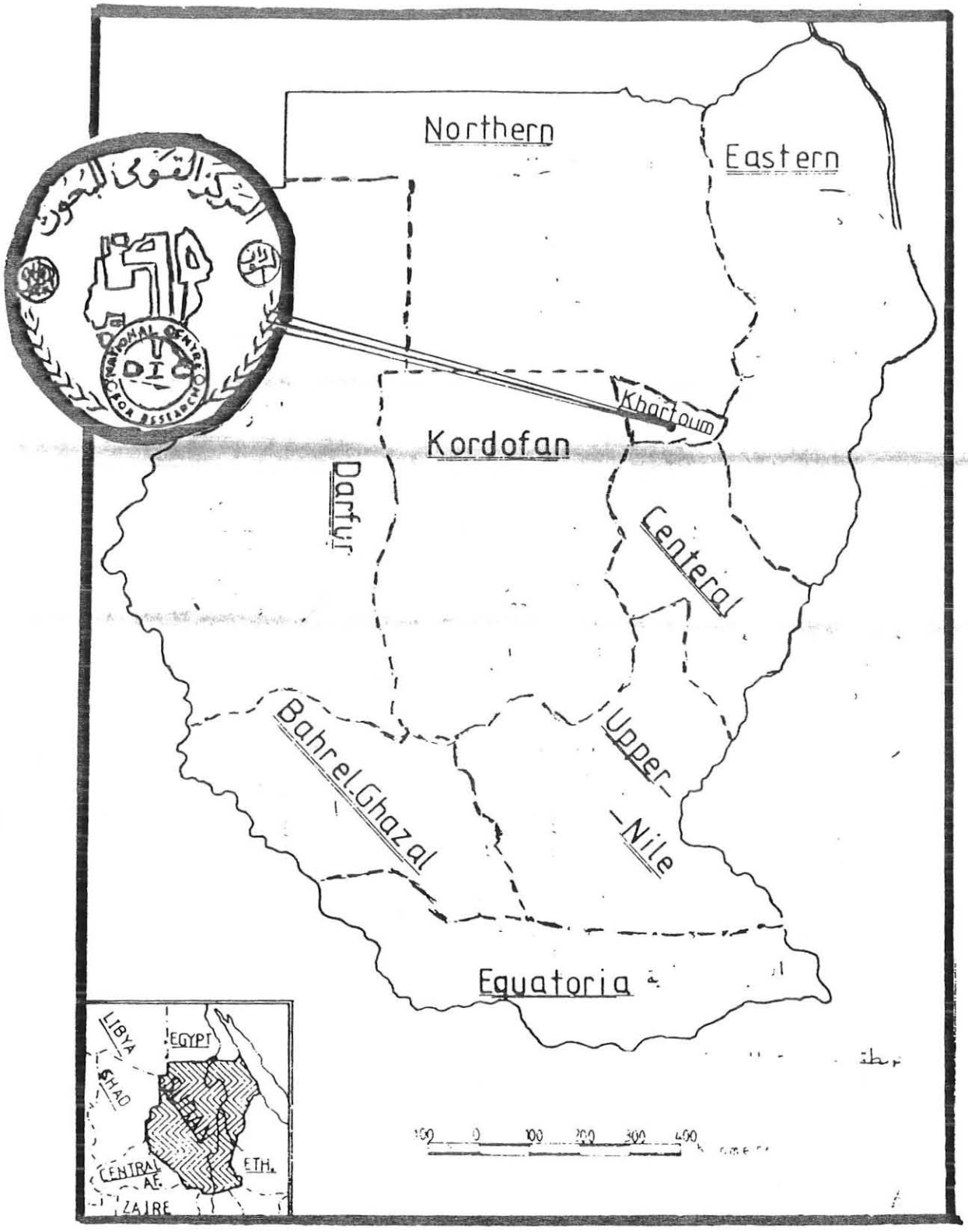
MAP OF SUDAN



DIC stands for Documentation and Information Centre

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CHAPTER ONE

INTRODUCTION

1.1 SCOPE OF THE PROJECT

This study is to evaluate critically the products and services, more specifically the databases, abstracting services, the inventories and resource sharing activities of the National Documentation Centre (NDC) in Khartoum, Sudan, with a view to proposing appropriate measures to enhance the usefulness of the products and services.

1.2 OBJECTIVES

a) To analyze and evaluate the current status of DIC's services and products;

b) To suggest ways of neutralizing some of the constraints that hinder the system so as to enhance its services and products, and improve management efficiency; and

c) To propose some methods of integration which will enable the NDC system to provide access to a wider range of information and information services to meet the needs of different user groups and enable optimal use of computer resources and personnel.

1.3 WORKING DEFINITIONS

1.3.1 Information System

An information system comprises of a combination of various components including facilities for the collection of data its storage and retrieval and dissemination to users. These functions require institutional infrastructure and arrangements for collecting data from information materials from various sources at national and international levels, storing, processing, retrieval and preparation of information products and provision of services to meet the needs of users of the system [Inganji 1986].

1.3.2 National Information System

A national information system is a set of interrelated institutions and personnel to provide various categories of users with information and advisory services relevant to their changing needs.

1.4 BACKGROUND OF THE NATIONAL DOCUMENTATION CENTRE

1.4.1 Establishment and Development

In Sudan, in the early past, libraries were small collections of books and manuscripts owned by religious leaders and tribal chiefs. They were consulted for information

on different social, economic and religous matters. At the beginning of this century, libraries with small collections of books were established in schools and for British senior administrators and officers. Science libraries (special libraries) were established to support research in the Wellcome Chemical Research Laboratories, the Stack Medical Research Laboratories, Agricultural Research Library, and also in some of the Ministries, and other Government Departments in the country [Mamoun, 1971].

The National Documentation Centre (NDC) was set up as a part of the National Council for Research (recently renamed as the National Centre for Research), and designated as a national centre for legal deposit. NDC started its activities by creating a specialized library with assistance from of the United Nations to provide information services to government sponsored research. And this marked the initial step for establishing a National Information System. Since 1978, NDC has assumed this function and carried out surveys of the information infrastructure in Sudan under UNESCO sponsorship.

There has been a number of events and activities which have enabled Sudan to make some progress towards developing a national documentation and information system involving the coordination of libraries, documentation centres and other information centres.

NDC also has realised the need to strengthen and systematize the activities and services for collecting, processing, retrieving and providing bibliographic information on Sudan. NDC has therefore introduced microcomputers and micrographics, with a view to increasing the coverage and comprehensiveness of its abstracting services Sudan Science Abstracts (SSA) and to augment its Library's Sudan Collection from local and foreign sources. Supporting these activities NDC started in 1988 a National Database of Sudanese materials called "LIBRI" and also has been preparing a database for the National Register of Current Research called "NDC" using Unseco's Micro CDS/ISIS.

In December 1991, the National Council for Research was restructured and NDC was renamed Documentation and Information Centre (DIC) in order to more accurately reflect its range of responibilities including those for undocumented and unpublished information.

1.4.2 INFORMATION RESOURCE SYSTEM OF DIC

The information systems currently in operation are:

1.4.2.1 National Database

Produced since 1988 covering Sudanese scientific, technological and socio-economic materials called "LIBRI" with outputs:

a) **Sudan Science Abstracts (SSA)**

Produced since 1979, SSA aims to capture documents and process the scientific, technical and other development related literature of Sudan and to disseminate research findings. The SSA acts as a channel of communication between researchers within Sudan and between them and their counterparts in other countries.

b) Also the Sudanese materials which do not appear in SAA.

1.4.2.2 <u>National Register of Current Research (NRCR)</u>

Produced since 1983, NRCR contains information on ongoing research projects, surveys and doctoral dissertations in and on Sudan. It supplements the SSA by providing current research information service to researchers, planners, research managers as well as funding agencies.

1.4.2.3 The databases associated with the above and literature search and provision of library services.

1.5. JUSTIFICATION FOR THE STUDY

NDC's information products and services have been in operation for over 3 years now. Attempts have been made to enhance NDC's role and effectiveness as Sudan's national

documentation and information centre supporting research, development planning, decision making and projects monitoring and evaluation. However, a number of factors, some internal to the NDC system and others of the wider national environment, appear to constrain the effective and efficient implementation of the programmes and activities of the centre. This study will attempt to identify, through systems analysis, surveys, interviews etc, these factors and propose a viable approach to overcoming the problems and constraints.

CHAPTER TWO

EVALUATION OF INFORMATION SERVICES AND PRODUCTS

2.1 BACKGROUND

Evaluation of information systems has been practised since libraries and record keeping systems began. The rise of this new concept was primarily due to the development of documentation systems giving scope for comparative studies of their effectiveness. Evaluation in that era was concerned with various indexing schemes and information storage and retrieval systems, as well as computers in their role in solving problems.

A series of performance experiments had been carried out along the Cranfield lines during 1960s and early 1970s generally directed towards operational decisions. This resulted in setting up measures of system performance.

Both manual and automated systems have been submitted to many types of evaluations, simply aimed at demonstrating the feasibility of new approaches [Bawden 1990]

The stimulus of Cranfield tests led to heightened interest in laboratory studies of information systems. Here the primary aim was to examine retrieval models and methods and thereby to develop and improve retrieval

performances. Most of the tests were statistical in nature.

Most recent lines of research have been based upon techniques of artificial intelligence and user modelling; concentrating on management and cost effectiveness.

Since 1969 Katters suggested the need for evaluation of information products and services and this led to the rapid development in libraries and information centres and their usefulness to society.

2.2 LEVELS OF EVALUATION

Evaluation can be categorized at differing levels of specificity. There are many ways suggested by different writers in which the levels of evaluation can be viewed. Examples of these are mentioned in the following sections:

2.2.1 King and Bryant [1971] see evaluation as firmly within a decision-making context. They give the following decisions to be supported:

- design or implement new system
- modify the existing system
- determine the need for continuous monitoring of system effectiveness

2.2.2 Swanson [1975] gives levels of evaluation with seven objectives

- assess set of objectives prior to implementation
- determine how will expected performance are being realized
- determine specific successes and failures
- uncover principles underlying success
- explore techniques for improving effectiveness
- establish a foundation for further research
- redefine system objectives

2.2.3 Lancaster [Bawden 1990] suggests that information services can be evaluated at any one of six levels:

- cost
- effectiveness
- benefit
- cost-effectiveness
- cost-benefit
- cost-performance-benefit

He explains that effectiveness relates to satisfaction of the needs of users. It should be measured objectively and quantitatively.

2.3 EVALUATION CRITERIA

Evaluation of information services required identification of their objectives against which the performance/effectiveness of the services can be measured. These objectives can be developed into criteria for evaluation which are considered as fundamental elements in the evaluation because

1. These criteria are used to measure the achievements; and
2. The variables derived from the criteria may be used to describe the operational features of the activity that is to be evaluated.

The criteria discussed below are those proposed by Lancaster [1978]:

2.3.1 Cost: time or effort is involved in the use of the system which can be affected by information seeking behaviour.

2.3.2 Cost measures: which are related to the quality and cost-effectiveness measures.

2.3.3 Response Time: different response time requirement is directly associated with different needs. This requirement is the delivery in

time and in comprehensive form.

2.3.4 Qualitative measures:

a. Coverage is a measure of completeness of a collection/database

b. Precision is to measure signal to noise ratio in certain kinds of information systems.

c. Recall measures the relevance of materials which is actually retrieved to the user's query.

d. Novelty refers to newness of the information provided by services and it is important in the evaluation of current awareness service.

2.4 FACTORS AFFECTING PERFORMANCE [Swanson 1975]

Efficiency of national information centre specially in a governmental organization is the relationship between its performance and inputs necessary to achieve this. So the performance can be influenced by

2.4.1 Environmental parameters

- number/kinds and languages of information sources relevant to certain specialized field
- the information needs and behaviour of users
- government planning, structure and strategies

- financial resources and disposal of information development
- general economic situation.

2.4.2 Functional parameters

Determined by the management of the observed system itself and related to the organizational structures of individual operational functions:

- kind and number of information sources acquired, analyzed and stored per unit time
- classification and indexing systems
- depth of indexing, volume and characteristic of indexing languages
- keyboarding and storage techniques
- retrieval techniques
- types and forms of various services, techniques of data output.

2.4.3 Institutional parameters

- organization and legal form
- manner of financing
- geographic location
- area of information to be covered
- forms of cooperation with other agencies

- organization of labour
- composition of personnel, type and capacity of mechanical equipment.

2.4.4 Indexing and Abstracting

- kinds of information sources processed
- subject field
- number of information processed per unit time
- qualification and conscientiousness of indexing and abstracting personnel
- specific organization of labour
- documentary language
- volume and characteristics of vocabulary used
- exhaustiveness

2.5 EVALUATION OF INFORMATION SERVICES/PRODUCTS

Information services are the total picture, as perceived by user, including both resources and systems; evaluation here implies some assessment of overall performance.

This kind of evaluation is concerned with

2.5.1 Evaluation of document delivery to study the ability of information centre to provide needed documents from its own collection.

2.5.1.1 Evaluation facets

A. Evaluation of the collection

1. Recognition of a minimum size below which it would not be feasible to operate satisfactory service
2. Outside standards

- Individuals needed: one or more consultants to examine the collection and to judge its quality which is usually used in evaluation of a specific collection in the bibliographic resources of the country
- obtaining user's reactions/ evaluation of documentation list.

B. Evaluating Document availability

1. Document delivery test

The construction of a representative citation pool and the application of this to determine what proportion of the documents are owned and how readily available these documents from and through the centre concerned.

2. Controlled sample

The selection of a period of time in which the demands of users are monitored and success rate of document delivery is measured.

C. Evaluating the Catalogue

This evaluation is used to determine:

- how frequently it is used
- with what degree of success it is used
- what problems are involved in its use
- whether the catalogue or its use can be improved

This can be conducted at pre-search, post-search and running interviews. Search failures can be explained as being due to:

- not in collection and not on order
- on order
- not yet catalogued
- user is unable to locate entry for item because of
  - misfiling
  - incomplete entries/inaccurate information on title and author, etc.

2.5.2 Evaluation of Information Retrieval

2.5.2.1 Evaluating Question-answering

Designed to answer specific factual questions which will be used to evaluate the system either through;

a. Obstructive test:

to test the absolute time unit in which all questions must be completed by the staff member of information centre. Orr has developed citation verification test in which members of the staff in a library are asked to verify the existence of documents from bibliographic citations that are incomplete; or

b. Unobstructive test:

similar to obstructive test in that it requires the compilation of a set of questions for testing current awareness. This test is used in the evaluation of reference services of public libraries and also applicable to information services of information analysis centre; or

c. Observation of reference librarians or other information specialists at work in the actual conduct of question- answering task. It is use to study efficiency.

2.5.2.2 Evaluation of literature search services

Search is conducted to find bibliographic material on a particular subject. The search is performed using a card catalogue, printed indexes, etc.. It evaluates the performance criteria mentioned above.

Performance measures are of several types which are applicable to the evaluation of:

1. Literature searches conducted in conventional printed tools.
2. Searches conducted in computer-based systems online/offline, for retrospective search or current awareness purposes.
3. Subject searches conducted in card catalogues by staff or user of the library.
4. Printed bibliographic tools.

2.5.3 Evaluation of automated systems of the information centre

The effectiveness of the automated system can be evaluated:

- at various levels using different parameters including accuracy, volume of transactions handled and speed of processing
- by comparing the performance of an automated system with that of a manual system.

An automated system may be judged cost-effective if it performed either at the same level of effectiveness at the cost comparable to that of the manual system. Unfortunately the situation is not simple. Frequently the automated system provides capabilities that are almost impossible with the manual system.

Thus, an important element in evaluation will be cost benefit analysis.

The adopted methodology for this study of the level of effectiveness of DIC services and products will be discussed in the next chapter.

CHAPTER THREE

METHODOLOGY

The aim of the study is to examine the extent of utilization of the products and services provided by DIC. Accordingly the related information was collected through

1. Survey of users of DIC using questionnaire
2. Analytical study of DIC products (e.g. citation analysis)
3. Discussions with the users and information specialists.
4. Systems analysis of the existing system in DIC

3.1 QUESTIONNAIRE SURVEY

A questionnaire was designed with the help of the DIC director. The aim of this questionnaire is to survey the users of DIC services and products and their views about the services.

The survey took place from mid July to the first week of September 1991 in Khartoum. Some 100 questionnaires were distributed in Khartoum and 20 in Gezira, as per the mailing list for the distribution of DIC publications.

The questions were framed to elicit data and information relating:

- to the environment in which DIC products are used;
- to the purpose for which the products are used;
- to how did the users came to know about DIC services and products
- to what they did with the products/services
- to their views and comments on quality of the products/services
- to their suggestions for improvement.

[COPY OF QUESTIONNAIRE IN ANNEX 1]

3.2 ANALYTICAL STUDY

Citation counting techniques were used in the evaluation of information on Sudan as well as the impact of computerization. This study was devoted to examining the contents of Sudan Science Abstracts (SSA) issues in relation to

1. Subject coverage
2. Types of publication
3. Timeliness
4. Scattering of articles in different journals
5. Language-wise scatter.

A similar analysis was done on the National Register of Current Research (NRCR) in relation to coverage

1. Research Centres per region
2. Research Centres per sector and field
3. Research projects per field

3.3 DISCUSSIONS WITH USERS AND INFORMATION SPECIALISTS

3.3.1 I visited about 15 libraries and information centres in Khartoum and Addis Ababa (ILCA and PADIS) to study the following :

- compare what is currently developed in DIC and constraints which are hindering the maximal use of the existing system
- to collect opinions of information specialists on the productivity of a National Information Centre including its services and products.
- the effectiveness of DIC as a National focal point.

3.3.2 Literature review

a) During July - September 1991, I have studied the files, reports and other documents relating to DIC as well as the information sector in Sudan.

b. I consulted the following two surveys which were carried out and not yet analyzed:

- Survey of libraries in Sudan carried out by DIC and British Council since 1990; and the work is not yet completed.
- Survey of computers carried out by the National Computer Centre of the National Centre for Research, conducted in August 1991 and not yet analyzed.

This literature review helped to identify existing systems of DIC, the resources and facilities which are important to this study as well to the national information network and information infrastructures of the country.

3.3.3 Systems analysis

I have used some of the information of the system analysis report on DIC as a course requirement [Systems, Analysis, Design and Evaluation II, the School of Information Studies for Africa (SISA)]. This report tried to study how integration of certain actitivities, the National Documentation Centre (NDC) [recently renamed Documentation and Information Centre (DIC)] could improve the library service and to share facilities with libraries and information centres in and outside Sudan.

CHAPTER 4

SUDAN AND ITS INFORMATION INFRASTRUCTURE

4.0 SCOPE OF THE CHAPTER

A country's geography, climate, natural resources, flora, fauna and other physical environmental factors affect its population distribution, occupation of the people, the economy, industry, trade, etc. Geopolitics, national politics, ideologies etc.. influence science and technology development human resources development, the structure of government, its attributes and policies toward trade, international relations, various elements of national infrastructure etc. All these individually and in combination influence information needs of people involved in diverse ways in development activities, and constrain or support information generation, capture, processing and dissemination as well as the development of the related information infrastructure and policies. Therefore, the following sections give a brief overview of the economy, development plans, resources and industries of Sudan.

4.1 GEOGRAPHY

Sudan lies close to the centre of Africa between latitudes 4° and 2° north and longitudes 22° and 28° east. It is largest country in Africa with an area of about 2.5 million square kilometres bordered by eight countries which are Central Africa, Chad, Egypt, Ethiopia, Kenya, Libya, Uganda

This present study was carried out to analyze the whole system of DIC from October 1991 to mid of January 1992. The information about the DIC system was collected in July - September 1991.

3.4 CONSTRAINTS OF THE STUDY

- acute problem of transportation in Khartoum;
- not an easy task for a single individual to cover the different institutions which are scattered in a big city as Khartoum in a period of just two months;
- the need to follow up the questionnaire more than three times to get the completed ones;
- events in Khartoum University on August 1991 and February 1992 prevented me from collecting the completed forms from the University;
- the materials sent by DIC to different institutions are not circulated. When a change of the director-ship took place, the new person was not aware of DIC publications; and
- most of the documents useful for this study were available only in one copy each and I had to struggle to get photocopies of them.

and Zaire, with the Red Sea in the east. It has some million feddens of cultivable land of highly fertile soil, constituted by silt washed down from Ethiopian highlands. Rivers of major importance in the country are the Blue Nile and the White Nile. The water hyacinth in the White Nile makes navigation difficult. The Blue Nile is swifter and deeper than the White Nile which brings fertilizing floods.

Severe and widely differing climatic conditions, such as, heavy rainfall, aridity and sandstorms characterise Sudan. The rainfall ranges from almost nothing in the north to 57 inches in the south, from desert to high rainfall savanna and inland flood plains.

There are plateaux over 1,500 feet high in the South and from 4,000 to 7,000 feet high in the Red Sea.

It is divided administratively (in 1991) into nine States. The States are in turn divided into sixty six (66) provinces. The towns are few and scattered.

4.2. ECONOMICS AND DEVELOPMENT POLICIES

4.2.1 1956 -1960

The government sought to encourage private investment in industry, particularly in activities that might generate exports. During this period a clearcut separation existed between private and public sectors. The public sector concentrated on the provision of infrastructure and large scale agricultural schemes. A partial transformation of

colonial industrial and agricultural structures was initiated during this period, but limited size of market and original concentration of economic activity around Khartoum and the towns hampered the development.

4.2.2 1961/62-1970/71

With the formulation and implementation of the first development plan, government participation in industrial sector increased. Public factories were constructed primarily in the agro-industrial sphere, where the scale of the projects was beyond the means and competence of private enterprises but the emphasis remained on local and foreign private sectors. Import substitution projects mainly consumer goods, predominated. Of the actual investment of £S 565.4 million envisaged for the ten-year period, £S 228.4 was expected from the private sector. The targets were exceeded up to the mid-1960s due to the rush of donors in the early years of Sudan's Independence. However, levels of investment tapered off and in 1969 the plan was shelved.

4.2.3 1970/71- 1979/80

There was a major shift towards central planning and the plan had to be revised. Both local and foreign private enterprises were nationalized and the share of the public sector in manufacturing sector increased almost to 60% of total assets.

A new Act covering industrial policy and investment was promulgated in 1972 providing more generous incentives and assurance against nationalization [Nimeiri, 1976]

Since targets had not been met by the end of the five-year plan period and foreign capital had begun to flow into Sudan from the Arab Oil States in the face of the 1974 oil price rise, the government extended the plan to 1977. By that year the government with the assistance of its Arab donors had conceived new directions for Sudan's development. The aim was to make Sudan the "breadbasket of the Arab World". A five billion dollar investment program covering a 25-year period to expand the production of wheat, sugar, vegetable oils and meat was formulated. On the industries the government invested in large-scale manufacturing plants in sugar and textiles. There were, however, no built-in ambitious projects.

4.2.4 1981/82 -1986/87

In 1978, the country faced financial difficulties as many Arab countries withdrew their support leaving the government to finance many projects on its own at a time of high oil prices, interest rates and inflation. The onset of a drought exacerbated the government's financial difficulties. In March 1981, the sixth plan was replaced by an International Monetary Fund (IMF) inspired stabilisation programme and a series of three-year rolling austerity plans that sought to balance the economic structure and promote exports. While the austerity

measures had a beneficial impact, the impact of the adverse balance of payment and the shortage of foreign exchange was felt by most sectors. In 1984 the government announced yet another shift in policy of islamization of the economy to be accompanied by investment expenditures totalling S£ 204 millions. In turn, the islamization policy was shelved in 1985.

4.2.5 1988/89 -1991/92

Salvation recovery programmes based on the prescriptions of the IMF and World Bank, which envisage a radical overhaul of government macro-economic policies were introduced. These prescriptions included:

- austerity measures to curb the increase in current expenditures at all levels of government;
- rationalization of financial relations between central and local government's reliance on budgetary transfers;
- raising the level of taxes and certain prices charged by the public sector enterprises;
- keeping the development budget expenditures at a level that can be financed from non-inflationary domestic sources and external loans on favourable and sustainable terms; and
- depreciating the value of the Sudanese pound against dollar and taking effective measures to liberalize the economy.

IMF's policy of liberalisation of exchange rate and trade regime, was based on the argument that the Sudanese pound was over-valued due to the higher rates of inflation in Sudan than in her trading partners' economies; and that devaluation alone could provide sufficient incentives for agricultural producers to increase production and an efficient exchange regime would allow and free flow of imports to agriculture and manufacturing to promote their growth. Sudan's difficult situation was seen as a direct outcome of monetary disequilibrium triggered by the lack of fiscal discipline.

4.3. NATIONAL RESOURCES [Barlag 1977]

4.3.1 Human resources

Sudan's population is estimated at about 23 million before the drought. The population is expected to increase to 37.3 by the year 2000. Although the population density for the country as a whole is extremely low at about 9 persons per sq km, large areas of desert being unpopulated, about half of the population lives on less than 15 per cent of the land, forming prominent concentrations, broad belts of relatively dense population westwards of Kordofan and Darfur, eastward through the southern parts of the eastern state and southward parallel to the Nile. Since Independence there has been a steady drift of rural inhabitants to the urban areas, with levels of urbanisation rising from 8.3 per cent in 1966 to 17.6 per cent in 1972 and now estimated to be about 30 per cent. Over 10 per cent of the population live in the capital city's three towns:

Khartoum, Omdurman and Khartoum North and in adjacent areas of the Central State. The pace of urbanisation has been accelerated by the droughts and famines of recent years since the food distribution system is better in the cities. Approximately one million refugees have arrived in the capital alone, adding a heavy burden to the city's over-stretched infrastructure and swelling the ranks of urban unemployed [Clarke 1985].

According to the International Labour Office estimates the labour force totalled 5.7 million in 1988, which represents 30 percent of the population and about 250,000 unemployed workers or 5.3 per cent of the labour force and about 250,000 Sudanese working abroad [El Majalla 1992: 58-60], mostly in other Arab countries. The number of emigrant workers increased during the early 1980s and at one time represented over 60 percent of the stock of professional and technically trained manpower in Sudan. The flow of migrants' remittances has been an important source of foreign exchange and the loss of up to 5 per cent of the labour force may have helped keep the unemployment rate low.

4.3.2 Education

Levels of educational achievement are very low in Sudan. Illiteracy rates are estimated at 82 per cent for females and 55 percent for males. What is more, educational enrolment has not kept pace with population growth. In 1984/85 there were

8,8745 primary, intermediate and secondary schools with a total enrolment of 2.14 million pupils, of whom 41 per cent were girls. There are also six major universities of which two are technically oriented (one at Gezira and the second at Juba, but due to insecurity, staff and students have been shifted to Khartoum). In addition, there are nine colleges of further education. The total post secondary enrolment was less than 149,300 students in 1985/86 of which 41.85 per cent were female [Yousif 1986].

There is an acute shortage of trained manpower at every level. Training is provided by only a few institutions. However, the number of graduates is insufficient to meet the needs of the different sectors of the country. In an attempt to address this problem the government sought to restructure the education system during early 1980s and also the higher education system in 1991 so that the skills of graduates at each level would be more appropriate to the country's economic development needs.

4.3.3 Agricultural Resources

About a third of Sudan's land area is considered suitable for some form of agricultural use but only a fraction of this land is currently under cultivation. Of this total 86 million feddans are arable land but there are wide variations in the cropping pattern, yields and degree of commercialization between the agricultural regions and the traditional rainfed,

mechanised rainfed and irrigated sub-sectors.

The traditional rainfed sub-sector covers an area over 9 million feddans spread throughout the country and supports perhaps two-thirds of the rural population. It is expected to produce much of the dukhn (bulrush millet) and dura (sorghum) grown in Sudan, and some sesame, groundnuts and gum arabic, though production is, for the most part, at a subsistence level. Few inputs are used and most farmers practise shifting cultivation on account of the unreliability of the rainfall and poor quality of the soils. Although all unregistered land belong to the State under the Land Act of 1970 customary rights of land usage have evolved. Land generally reverts to the community when left fallow.

The mechanised rainfed sector covers about 10 million feddans and is geographically confined to the western and eastern states of the country extending along the savanna belt. Sorghum and sesame are the main crops and production is market-oriented. Unfortunately the sector expanded more rapidly than was consistent with good farming practices during the 1980s. Over-cultivation, short and bare fallow lands and heavy machinery all took their toll of the soil and when the drought came in 1984/85 wind erosion became an environmental problem.

The most important food crop cultivated is dura which is also the second most important export commodity in normal rainfall year. Over 90 per cent of the sorghum is cultivated

on rainfed sites and so production varies widely from year to year. Wheat is also an important food crop though Sudan currently produces less than half of its domestic consumption. Imports of wheat have increased under pressure of an increasing urban demand, where bread has been adopted by many as staple food. Wheat production in Sudan is costly and inefficient, but the government feels the need to balance security of supply and the need to diversify away from cotton.

Cotton is the most important cash crop product. The country is the world's largest producer of long staple cotton. However, production and exports have fluctuated widely. Production is currently on the rise again following an intensive rehabilitation programme and favourable climatic conditions. Higher world prices have encouraged improved marketing and this caused more land to be put under cultivation.

Gum arabic is considered as the second most important export commodity. Sudan is also the world's largest producer of edible gum accounting for 92 per cent of world' production. In recent years, however, the market for both products has been eroded by the production of artificial substitutes. Much of the output comes from wild trees. There may be scope for increasing production and reducing costs by increasing the area under commercial plantations.

Sesame is also an important export crop that has increased in importance steadily since early 1967. Locally it is used as a source of vegetable oil.

Sudan is also the second largest African producer of groundnuts after Senegal and its production decreased due to the low world prices and decline in the area of cultivation.

Besides the cash crops, there is potential to produce rice, coffee and tea in the south. Unfortunately, civil war has hindered the government efforts to increase the production of these crops.

About 40 % of the total area of the country is classified as grazing land, much of this is semi-arid scrub in the north of the country and seasonal swamp in the south. These grazing lands support a livestock population of 20.5 million herds of cattle, 19.3 million sheep, 13 million goats and 2.7 million camels. Productivity and herd take-offs are, however, low. Most of the herds are owned by the tribes who regard their herds as a mark of wealth and are reluctant to sell animals. Consequently the number of animals brought to market is far below the potential and the quality is generally poor. The predominantly social rather than economic motivation for herd ownership must be seen as a major constraint in the development of livestock products processing industries. It also some other implications since it has encouraged overstocking leading to desertification in large areas of the country.

4.3.4 Energy Resources

In most rural communities and the amongst the urban areas, wood remains the most important source of fuel. This has precipitated an environmental crisis on the outskirts of the urban centres and around many villages where much of the vegetation has been removed paving the way for desertification. The further diffusion of other sources of energy such as electricity and petroleum products is a matter of urgency. The potential for solar energy has apparently not been tapped yet.

4.3.5 Mineral resources

Gold and chromite are the only two minerals currently mined in Sudan. Other minerals are known to exist including silver, iron, copper, lead, mica, asbestos, talc, tungsten, zinc, diamonds and even uranium. As yet, there has been no systematic study of the country's mineral wealth. The French government Bureau des Recherche Geologique et Mines working with the government of Sudan has found several other minerals in the Red Sea Hills. They identified a rich polymetallic deposit of silver, gold, copper and zinc but no economic evaluation has yet been undertaken. A geological survey followed by economic feasibility studies might prove a remunerative investment in the long term.

4.4 HISTORY AND POLITICS

Sudan gained its independence on January 1, 1956. However its history dates back to the 8th century B.C. when the thousand year occupation by Egypt ended. In the last centuries of the Pre-christian era, a number of independent kingdoms arose in Sudan. The still visible stage heaps provide evidence of large scale operations of the industries. Coptic Christians reached Sudan in the 6th century A.D. and the two christian kingdoms survived there from 569 until they were overthrown by the Moslems in 1315 and 1504 respectively.

Between 1820 and 1885 Egypt ruled the Sudan as a Province but in 1899, after the suppression by Anglo-Egyptian troops of a revolt led by Moslem leader, "the Mahdi" and lasting from 1881 to 1898, Sudan was converted into an Anglo-Egyptian Condominium. From 1899 until 1954 Great Britain dominated Sudanese administration.

The slave trade, in which both the Arabs and Europeans participated extensively in the 19th century, had disastrous affects on the country's economy, political life and culture. Further havoc was wrought by the Mahdist rebellion. As a result of war and disease, in brief, it has been estimated that the population of Sudan fell from 9 million to 2 million.

A constitution for Sudan, promulgated in 1948 provided for an Executive Council, to be composed equally of Sudanese and British and partially elected legislative assembly. In 1951, however, Egypt abrogated her treaties with Great

Britain, and King Farouk began to style himself king of Egypt and Sudan - a title which was not recognized by Great Britain and by the majority of Sudanese.

After a long period of intermittent negotiations, the two governments in Feb 1953 signed the Anglo-Egyptian Agreement providing for supervised self-government for Sudan beginning immediately and continuing for 3 years, at which time the Sudanese would decide whether Sudan should be united with Egypt or become independent. Elections for the Parliament of the Sudan were held in November 1953. The National Union Party led by Ismail Al-Azhari won a majority in this parliament. Azhari announced that he favoured independence for Sudan, and in December of that year the Parliament voted in favour of full independence. The Republic of Sudan was proclaimed on January 1, 1956.

The First government of independent Sudan, formed by Al-Azhari, was succeeded on July 7, 1956, by a government under the leadership of Abdullah Khalil. The first parliament had constituted after independence was in February 1958. These parliamentary governments were headed by a Prime minister and appointed a council assembly to draft a permanent constitution. The Chief of the state was a five member supreme Commission with the presidency of the commission rotating monthly among the members.

On November 1958, a new regime was installed consisting of Supreme Council members and most of the ministries occupied

by officers of the army. Parliament was abolished, and political parties were banned.

This regime had followed a publicly stated policy of neutrality. It has maintained friendly relations with the United States, United Kingdom and Western European countries. Relations with Egypt had been disturbed at times, especially by the dispute over the division of the Nile waters between the two countries.

The civilian representation is from tribal leaders, administrators, merchants, farmers and religious leaders who constituted the Central Council.

Unrest in the south had grown in intensity under this regime, ultimately leading to the outbreak of the armed insurgency in 1963, the critical interactions which led towards civil conflict.

Massive popular demonstrations and general strike, reinforced by misdirection of junior and middle ranking officers which bought down the military regime.

On 30 Oct 1964, a transitional government was formed under the leadership of Sir al-Khatim Al-Khalifa. In April 1964 elections were held in Northern Sudan only due to the state of insecurity in the south, resulting in the Umma Party and NUP emerging once again. This second parliamentary period, provided the frame work within which a series of governments succeeding each other over the 1965-69 period. The conflict in the south continued.

On 25 May 1969 the second military regime, Revolutionary Command Council (RCC) members composed of the free officers was formed. In October 1970, RCC re-shuffled those who were associated with the Communist Party. The political system was limited to Sudan Social Union representing sectional and occupational interests.

Most outstanding success of the regime was achieving peaceful settlement of the Southern Sudan in March 1972 as well as giving regional autonomy.

Important features of this regime are:

- awareness of political dangers
- introduction of decentralization and regionalization policies
- the civil war re-emerged in southern Sudan
- economic failure led to political disintegration
- the drought which affected Sudan severely.

This regime gradually began to change its objectives and orientation and to create a basis of Islamic legitimacy.

Political, professional, trade union groupings organized and promoted apposition movements. The Minister of Defence and Commander in-Chief responded to their demand by taking over power in 6 April 1985 and authority was placed in the hands of transitional Military Council. In March 1986 elections were held which resulted in the emergence of the Umma Party and Democratic Union Party and Islamic Charter Front. They used national policies more as tactics to gain temporary semblances

of popular support than as well conceived strategies for furthering the country's welfare.

On 30 June 1989, a new regime was formed consisting of Salvation Revolution Council with members officers of the army. Parliament was abolished, and the political parties were banned.

The political system is responsive to religious, cultural and ethnic diversities of Sudan. Federalism proclaimed as system of government in Sudan.

4.5 RESEARCH

Research has gradually developed after the establishment of the first laboratory "Wellcome Chemical Laboratory", the Cotton Research Station and then a number of other research institutions in various fields of science and technology which are attached to various ministries and government departments [Barlag 1977].

During the colonial period, scientific research was directed to serve the adaptation of imported products to the local market and the natural resources of the country which are exported and manufactured abroad. During that time, Khartoum University concentrated on undergraduates teaching and with pure research leaving all applied research to the specialized institutions.

After Independence, scientific research received greater attention of the graduates who had opportunities for higher

training resulting in the change in the status of research in Sudan. They examined the factors handicapping research and advised on the establishment of a national organization for research.

In 1970, the National Council for Research was established by a presidential decree with the following responsibilities [ACT, 1973] are:

" - to encourage, organize and promote scientific research in its various aspects with a view to the realization of economic development within the framework of State Policy.

- to formulate a comprehensive policy for scientific research and suggest the required plans, organization, and methods necessary for the implementation of general research policy in such a way as to ensure efficient and effective utilization of the human and material resources available at centres and units of scientific research."

Under NCR the following subordinate specialized councils were established:

- Agricultural Research Council [ARC]
- Scientific and technological Research Council [STRC]
- Medical Research Council [MRC]
- Economic and Social Research Council [ESRC]
- Energy Research Council [ERC}

The functions of the Councils are related to the five sectors in which NCR is involved. Each sector includes the representative of the research units in the Ministries and Departments, the Universities and Higher Education Council and National Research Council. The budgets, plans and programmes of areas of research which are discussed and submitted to the sectoral meetings and from the heads of the sectors to Board of Directors of NCR. The resulting unified proposals go the Executive and the Legislative Bodies.

The Finance for research is provided from the Central Budget and the development budget [local and foreign].

There were a number of meetings and discussions concerned with the development policies, priorities and strategies relating to scientific research.

The government has realized the important role of NCR in the research and development and proclaimed its restructuring in December 1991.

4.6 INFORMATION INFRASTRUCTURE

In this context, of course ambitions of creating libraries and information centres seem not only trivial but reflect a certain confusion of priorities. Surely Sudan needs agriculturalists, mechanics, engineers, economists, health workers and researchers. What use can there be for information professionals amongst the specialists. Well there is no doubt that Sudan need agriculturalists and other specilaists; but

Sudan also needs information with which the professionals and the common people are made aware of their development in their enivronment, in their area of their specialization so that they can function particularly, minimizing duplication of effort and conserving scarce resources, and development of infrastructures.

The results of neglecting to build information infrastructures are explained by Radia [Mohamed, 1989] as follows:

1. The internal and external efforts have failed to achieve objectives of development.
2. Absence of organized system, guided by an overall policy.
3. Lack of the standardization and consequent incompatablity among systems.
4. There is no proper utilization of scarce resources.

Information infrastructure is defined as national capabilities for making knowledge and information to work, that is putting knowledge to work [Atherton, 1975]. It concerns specifically with data collection, classification, cataloguing, storing, retrieval of information either manually or online and disseminating of information in different ways.

Since the 1960's the government had recognised the need for the development of library system. Sewell (UNESCO expert) surveyed the libraries in Sudan and presented 13 major recommendations which reflected the level of library development in

the Sudan [Sewell, 1961]. But library development made slow progress. Also, in 1971 Parker made a thorough study of the state of libraries and formulated a plan for overall library development and surveyed the component elements of a national information system comprising generators of information, information-processing agencies, the users and mechanism which allows the interrelationship and interactions of the component of element of the system. He suggested planning guidelines and proposed a scientific and technical information advisory committee, representing the component elements of information system. In 1990, a joint British Council and National Documentation Centre mission [Table 13]) dealt with

1. survey of libraries in Sudan;
2. the importance of enriching the libraries with books, periodicals and other collections to cater for modern information technology;
3. survey of libraries staff and their qualifications;
4. library staff training;
5. use of modern information technology in libraries
6. survey library techniques; and
7. library budgets.

The filled-in questionnaires returned do not cover all libraries of Sudan specially the school and public libraries because the survey work is not yet finished. I examined some of these completed questionnaires and noticed a slight change in the stock of libraries and have not introduced information

technology. Few librarians have been retrained .

4.6.1 Information Infrastructure Systems

The following information infrastructures [Mohmed 1989] use special working tools to collect, record, process, retrieve and disseminate the information:

1. Library systems include academic, specialized, public and school libraries.
2. National documentation system
3. Databanks in different governmental institutions and private sector
4. Records and archival system
5. Telecommunication and public communication systems
6. Informatic services units
7. Statistical system
8. Museums
9. Meteorological system
10. Remote sensing centres
11. Early warning systems
12. Audiovisual Centres
13. Reprography
14. Cartography
15. Graphics
16. Specialized institutions in field of information
17. Book trade
18. Computer centres.

4.6.2 Problems affecting the development of Sudan's information infrasturcture

The most important obstacle to information infrastructure building is the inadequacy of financial and material resources available for information activities. The cause of these inadequacies is low priority attached to the information systems by the government which works against developmental aspirations.

The situation has been exasperated by austerity measures and increasing commitments to planned expenditures enacted by the government, as the economic crisis it is facing worsens. However reasonable and desirable these actions may be, information systems have been neglected. The error lies in the habits of planners who incidentally are the most requesting information and yet fail to see the importance information projects on a par with other national priorities.

At present Sudan has no overall national policy or legislation governing, regulating and guiding the information activities, although there is a policy on scientific and technological information [Bassit, 1988]. There is also no mechanism for the coordination of information activities at the national level with necessary powers of decison making, implementation and monitoring specific programes and project. Even in the sectors where such structures exist, their

responsiblities and tasks are not properly defined or they lack the authority or the capacity to formulate and implement realistic policies at national levels.

A legislative framework does not exist to guide the creation and development of infrastructure. Along with scarcity of space, equipment and qualified personnel, inadequacy of legal deposit legislation, or its application have been impediments to the organization of national bibliographic control.

There is no central point within the government to which requests for publications could be addressed. There are often no set of standards for printing, numbering and circulation of the government publications and lack of application of library and documentation techniques to government documents to ensure their effective utilization [Yousif, 1989].

Equally lacking is reliable information on the sources of information, such as, directories of libraries/information centres and national union catalogues.

More recently, the Scientific Conference for Establishing Policies, Priorities and Programmes of Scientific Research in the country, [1989] organised by the NCR has given attention to the enhancement of national information capabilities, information resources and facilities including their planning and design and the need for comprehensive surveys of the existing information management capabilities.

In many cases where trained personnel are managing

libraries and documentation centres, they have been trained in schools of library science with rather traditional approach to librarianship. While the training in techniques of librarianship is an essential component of any properly functioning system, these is an equal need for training of a cadre of professionals knowledgeable in modern information handling methods to enable Sudan to keep abreast of the tremendous advances that are being made in the information field. Another shortcoming is the lack of middle level information specialists and technicians to shoulder the major part of the day to day responsibilities. Similarly evident is the shortage of technicians to operate reprographic equipment and other information technologies.

Information specialists are attracted to the Gulf and beyond by higher salaries. Also, given the choice, graduates would prefer to work in any area paying more money rather than in governmental institutions that pay less.

It is recognized that

a) lack of trained manpower is one of the major obstacles in the development of the information field, and the situation is particularly severe in Sudan;

b) recognized cadre for library and information staff is not available because library professionals do not enjoy a status on a par with other professions requiring similar qualifications ;

c) there is no proper manpower development planning;

d) DIC suffers from brain drain which makes continuous training essential to fill the gap;

e) lack of funds for training and training programmes; and

f) in 1991 the governement proclaimed the restructuring of higher education system in Sudan and, as usual, the field of information was neglected.

Some library, documentation and information activities have established without the necessary background studies and plans. The result is that their collections and services are not able to cope with changes and new challenges that their clients encounter. Organizations and institutions have equally neglected to plan the information they require, when they expand or intensify their overall programmes.

Even the few facilities managed by inadequate personnel fail to meet the actual and immediate needs of users. Researchers therefore usually turn to information centres in the developed world where some of the commercial services obtain materials locally from Sudan.

Although a few secondary information services produce retrospective bibliographies and current awareness, it is difficult under the circumstances to produce copies of the documents, referred to. This is mainly related to the fact that secondary services are not able to support document delivery.

The inadequacy of the investments in information infrastructures is reflected the imbalance in the supply and demand for information. The generalization by Baark from his study, could equally well be applied to the Sudan situation.

> "Most libraries and documentation centres still operates on the notion that when the information is available it will be utilized, without sufficient consideration to the intrinsic (sources, delivery modes and channels, time factor language factor, retrieval efficiency, coverage) and extrinsic limitations (socio-political framework, economic infrastructure, motivations to seek information). Too much emphasis of services and too little mobilizing demand. New information services tended to be based on traditional library services. Users studies are not conducted only occasionally. Little effort has been put into positive marketing of services..." [Baark 1986].

An important cause of under-utilization of information is the poor reading habits and lack of motivation to use of information by people at large.

A library association is a suitable body representing a confluence of knowledge and skills of the country. It can provide the members with a forum for sensitizing and educating non-members on the professional and technical aspects of the

field. The association can organise conferences, workshop, and training courses and catalyse public debate on issues of national interest. This can serve the dual purpose of providing feedback to the government and the information profession and keeping the public better informed about new issues relating to information policy, information technology, information industry, etc. In view of the importance of library associations in the development of the information profession and bearing in mind the numerous problems facing the profession in Sudan, the dormant library association of the country should be reactivated and energized.

The inadequacies of the national information infrastructure is the shortage of adequately trained information manpower. This shortage is mainly due to lack of training programmes and facilities. Numerous libraries and information centres in Sudan are being run by people who, to start with, had insufficient formal training in library and documentation science [Table 13].

CHAPTER FIVE

NATIONAL DOCUMENTATION CENTRE

A detailed systems analysis of the different units and activities of DIC was carried out in the period of 2.5 months during October 1991 to January 1992. The analytical information was supplemented by personal observations, interviews of the staff of DIC and as well as selected decision makers in the field. A report of the findings was prepared and submitted for SISA course INST 663 titled (System analysis on the Integrated Information System of National Documentation Centre (NDC), Khartoum, Sudan, Addis Ababa, January 1992). Given below are brief extracts from selected parts of the report.

5.0 DIC OBJECTIVES

The main objectives of the Documentation and Information Centre (DIC) of the National Centre for Research are:

1. To make information available to researchers through the Library and use of modern techniques to organize, classify, abstract and disseminate information.
2. To link with regional and international networks in order to make information available from relevant databanks.
3. To provide scientific and technical information services.
4. To contribute to the training of library/information professionals in Sudan.

5. To support studies and researches in the field of library and information science.

5.1 DIC ORGANIZATIONAL STRUCTURE

The organizational structure of The National Centre for the Research and of DIC are presented in Annex 2,3,4.

5.2 FUNCTIONS

With a view to achieving the objectives mentioned in 5.0, DIC has assumed the following broad functions:

1. Collect and accept data from different sources
2. Store the data collected
3. Process and organize the data
4. Retrieve data in response to and in anticipation of users' queries
5. Generate information products and services
6. Present data in a form and format convenient to users
7. Analyze and interpret data as necessary.

5.3 TYPES OF DATA BASES AND SYSTEM COMPONENTS

The information and data collected from various sources are organized into several databases:

1. Bibliographical databases

2. Database of profile of projects, institutions, experts and events

3. Data for DIC management

   a. Automation of library operation

   b. Automation of some secretariat tasks.

5.4 GROWTH OF INFORMATION SYSTEM IN DIC

There has been a number of events from 1974 onwards resulting and contributing to the development of the following information systems:

Name of the system	Assistance	Year
Specialized Library	UNESCO	1974
National Information System Survey	UNESCO	1978
Sudan Science Abstracts	UNESCO	1979
National Register of Current Research	UNESCO	1982
National Environmental Information Survey	UNESCO	1986
National Scientific and and Technological Information System	IDRC, FORD Foundation & Ministry of Finance and National Planning	1988

5.5 DIC COLLECTION

This collection is made up of:

Periodicals

28	periodicals/year purchased
70	gifted from UN, non-governmental organizations, Arab organizations
98	the total number of periodicals

Books/ Monographs etc..

Year	Number of Books
1978	7321
1981	9229
1984	11731
1990	14331

Monographs (less than 50 pages)

Year	Number of items
1979	1520
1985	2620
1989	3180

Sudan collection

Ranges 400-500 documents. After the establishment of the National Information System, the number increased to about 2500 documents during 1988 -1990.

Microfiche

Microfiche titles	1130
ILCA	500
UMI	150
IDRC	30
FAO	50

National Databases

Name of Database	Number of records
LIBRI	7,000
NDC	1,400
INFOTE	5,894
ULIST	862
EHDIR	79

International Databases on CD-ROM

MEDLINE	[1980 - OCT 1991]
ERIC	[1966 - SEP 1991]
CAB	[1987 - 1989]
TROPAC	[1975 - 1991]
AGRIS	[1986 - DEC 1990]
AGRICOLA	[1970 - JULY 1990]
INIS	[1990 - DEC 1991]
DIALOG	[NTIS 1985 - 1989]
SearchMe	[August 1989]
GNET	[Upto 1988]

5.6 COMPONENTS OF DIC

6.6.1 Library unit

6.6.1.a. Selection and acquistion

Head of the library informs all users of the DIC who are the researchers in different Councils (recently institutions) and units of the NCR to identify and request the documents of possible interest. Final decision taken by director of DIC.

The documents are acquired either by:

1. Purchase

   Since 1983 due to the hard currency restrictions, the purchase of books from aboard has been stopped and periodicals restricted to 15 titles sometimes using UNESCO coupons. The books are only purchased from the local market.

2. Free

- Exchange

  among the universities in the Arab states such as University of Jordan and University of El-Fatih, among the public, educational and research institutions exchange with Sudan Science Abstracts (SSA) and National Register of Current Research (NRCR) and the publications of the National Council for Research institutions; but in the recent years, these institutions have not discharged the agreement that NCR institutions must send seven

copies of their publications for this purpose.

- Donation

  DIC can get UN-publications, Arab and local publications freely from the corresponding organizations, institutions and professional associations.

  Donation in the form of funds, usually provided, for instance, by the British Council.

b. CATALOGUING

Cataloguing and classification using AARC2 and DDC respectively.

c. CIRCULATION

Only books are circulated to researchers in NCR excluding materials from the Sudan Collection.

5.6.2 Documentation Unit

5.6.2.1 Abstracting Services

Work involves

- Gathering original or primary material
- Identifying nature of material
- Bibliographic description according to established standard, depending on the nature of the document whether monograph, periodical, conference etc.

- Preparing an abstract either indicative or informative
- Classification using UDC
- Using free indexing techniques, terms being derived from the title and abstract to prepare subject index
- Preparing author index and geographic index
- Arranging entries under subject headings alphabetically by the author's name
- Numbering entries serially
- Printing

5.6.2.2 Ongoing Research Services

It is concerned with:

- collection of the data through questionnaire from all governmental, educational and research, non-governmental, regional and international organizations working in the country as wells from the embassies.
- survey ongoing research for a definite period
- analysis of questionnaire
- classification of subject of research using UDC
- free indexing to build subject index
- Prepare different indexes of researcher, funding organization, research organization, etc
- Prepare address list of research and funding organization
- Entry contains two main parts:
    - the first part gives research description, earlier classified according to six main

fields, further subdivided into related subfields. Presently, research descriptions are broadly classified according to UDC and arranged under subject

- Printing

5.6.3 Acquistion Unit

The unit attempts to acquire both published and un-published documents especially in the fields of Science and Technology, Social Science and Development.
It aims to maintain a collection of current and accurate materials; and to **IDENTIFY, LOCATE** and **ACQUIRE** documents related to Sudan. It contributes to the preparation of a comprehensive a national bibliographic database.

DIC is one of the institutions to which legal deposit of publications is applicable. It was also recognised that it would be useful if the DIC acted as a central depository for unpublished or non-conventional material which includes items ranging from reports, theses, conference papers... to trade literature and pamphlets not published through conventional channels.

5.6.4 Microfiche Unit

DIC Microfiche Unit was set up in 1990 with funding from the International Development Research Centre (IDRC) of Canada. The aim was to facilitate the acquisition of documents

related to the Sudan which cannot easily be obtained in hard copy. These include government documents, theses, existing special library collections with older documents now out of print, and documents from libraries outside Khartoum.

Its system fits into the computerised cataloguing system very easily through the microfiche accessioning system. Each document on fiche is given an accession number and this is added to the catalogue record on the computer when the document is catalogued. If an online search identifies references on fiche then they can be retrieved from their storage cabinet by using the accession number as the fiches are stored in accession number sequence.

5.6.5 Computer Unit

5.6.5.1 Databases were designed conforming to the Common Communication Format (CCF) of UNESCO's General Information Programme (PGI) using the UNESCO sponsored bibliographic database software Micro CDS/ISIS. The following databases are available:

1. National Bibliographic Database (LIBRI)
   comprising of Sudan Science Abstracts (SSA) and the Sudanese collection catalogue
2. Ongoing Research Database (NDC)
   1400 records of research projects
3. INFOTE Database downloaded from UNEP database covering sources of environmental information

4. EHDIR database which includes environmental specialists
5. ULIST database is a list of periodicals of DIC, Library of Medicine, University of Khartoum and National Health Laboratory
6. International databases on CD-ROM

5.6.5.2 Online Data Entering and Editing

Data is now entered directly via online worksheets for the SSA and Register databases (LIBRI and NDC respectively). This has saved time and effort. However, in spite of proof-reading the entries online, errors (spelling, form of entry, missing delimiters) are to be found in some records when displayed. Also, occasionally a document may be catalogued more than once inadvertently.

Normally in order to check whether a document has already been entered and to identify and retrieve entries for editing and correction with CDS/ISIS, the following steps are required:

* Select the Retrieval Services Menu (F3)
* Display term dictionary (T option)
* Select required term (press S) and search (press <enter>)
* Select Database Maintenance Menu (EXE1) (F4)
* Recall the retrieved records for editing (R option)

This is time consuming. Therefore a CDS/ISIS Pascal interface **QUICK.PAS** was developed (by Khalid Bashir Mohammed, Programmer, DIC) to facilitate these tasks.

DIC has also planned to maintain computerized thesaurus in the areas of its interest particularly in environmental topics. UNESCO provides along with CDS/ISIS a sample database (THES) and the pascal programme **THES.PAS** which enables the creation, maintenance and use of a thesaurus with a database. DIC requires some facilities in addition to what can be done with **THES.PAS** for example to add a term extracted from thesaurus to a specific field in selected records in a database. **MTHES.PAS**, a modified version of **THES.PAS** prepared at DIC has such additional features [Ghobrial 1991].

5.7 HUMAN RESOURCES

Title of job	Qualification	Number	Remarks
Senior Researcher	Ph.D.	1	DIC director
Researcher	M.SC	1	Head of Library
Assistant Researcher	M.Sc.	1	On leave
Assistant Documentalists	Higher Diploma B.Sc.	6	One on leave 4 Project staff
Assistant Librarian	Higher Diploma B.SC.	6	One on leave 5 Project staff
Technical Librarian	Middle diploma	2	
Programmers	-	-	vacant posts since 1990
Personnel officer	B.SC.	1	Project
clerks	SSC	6	3 project
Driver		1	
Messengers		5	

Note: Project staff do not have permanent positions in DIC.

5.8 FINANCIAL RESOURCES

DIC is included in the NCR administrative and finance structures

Budget:

Chapter one of budget is staff salaries

Chapter two including the current budget is as follows:

LS	Year
125,000	1989/1990
180,000	1990/1991
210,000	1991/1992

Breakdown of the budget 1990/91

LS	Purpose
Ministry of Finance	
20,000	Periodicals subscription
40,000	Printing and maintenance purposes
Ministry of Planning	
120,000	(Local fund + Foreign funds for National Information System Project)
80,000 (Canadian dollar)	Foreign fund by IDRC for project in addition two fellowships for master's degree

5.9 DIC AND NETWORKS

DIC participates in international/regional information systems and acts as focal point [Annex 5] to some of them.

5.9.1 UNESCO

Provides DIC with information on advanced techniques to improve practice through:

a. provision of support to consultancy missions to assist in development of various systems of DIC such SSA, NRCR

b. provision of funds and equipment such as computers and Micro CDS/ISIS software.

5.9.2 PADIS

- gives opportunities to Centre to develop leadership Cadre
- training courses e.g CDS/ISIS training in March 1990
- DIC provides PADIS with publications and required information.

5.9.3 Centre of Environmental Health Activities (CEHA)

- training courses in environmental health information

- DIC provides CEHA with information on environmental health institutions in Sudan as experts list or any information relevant to this areas.

5.9.4 INFOTERRA

INFOTERRA PAC has provided NDC with the following:

1. Information source selection guidelines
2. Information source registration
3. Information source Thesaurus
4. INFOTERRA directories
5. INFOTERRA index

Role of NDC:

A. Registration stage

1. Selection of source
2. Contact source if it will respond promptly to information requests
3. Registration of source by asking it to complete form and assist with NFP personnel and Thesaurus
4. Give the accession number to new source
5. Transfer the information on registration to coding sheet
6. Submit coding sheet to INFOTERRA PAC

7. Updating the INFOTERRA directories every five years.

B. Answering the Queries:

- register the query on request form
- if the information is available in DIC guide the user to the DIC Library else the user will be provided the information from other sources
- analyze the query in detail
- consult INFOTERRA thesaurus/directories/index
- select the five most relevant source outside country which is capable of providing the information
- send the query to the specified sources
- examine the received material and if the material is of such value the materials well be photocopied
- inform the user of availability of material or send the material to user
- registration of the query for statistical purpose.

C. Display

INFOTERRA materials are displayed during seminars and conferences related to the environment with the objective of

1. sensiting the users about INFOTERRA
2. providing users with the request forms.

5.9.5 National Network [Annex 5]

DIC established Scientific and Technological Information Network with bibliographic databases to support services and sometimes to suit the products and services to different categories of users.

DIC has set up a network of special libraries (12 libraries) which have interest in research publications. The intention is to improve the speed and the quality of information reaching the Centre's databases from receiving the information nodes.

DIC aims :

1. to avoid duplication of materials and thus allow greater coverage of literature and save hard currency
2. cooperative cataloguing schemes through use of comptible computers and software
3. coordination of training in both library procedures and in computer skills
4. jointly producing information tools such as directories of libraries, union catalogue, thesaurus
5. guide information policies formulaton,

This national network is small, still in its preliminary stage and not yet established to fulfil the goals.

CHAPTER SIX

ANALYSIS AND DISCUSSIONS

6.1 CITATION ANALYSIS OF SSA & NRCR

6.1.1 Sudan Science Abstracts (SSA)

SSA identifies, abstracts and indexes studies and research papers of relevance to Sudan currently published or presented at conferences or accepted for higher degrees by scientists in Sudan or abroad. SSA aims to disseminate the scientific and technical, social and economic research findings related to Sudan. The journal acts also as a channel of communication among researchers within and outside Sudan.

Entries in SSA are classified by the Universal Decimal Classification Scheme and are arranged by serial number assigned to each entry. Author and subject indices facilitate identification of relevant abstracts by referring to the corresponding abstract entry numbers. From SSA-7 up to SSA-12 at present, a geographical index is provided.

A bibliographic database [LIBRI] has been established from which SSA-6 up to SSA-12 were prepared.

Each issue contains approximately 400 entries (abstracts) and publications from 1963 upto 1991 have been covered. This study will analyze only the publications from 1979 to 1989.

In analysing these issues I noticed the following:

- Some symposia\conferences\workshops papers are

published in journals and considered as journal articles according to their availability in the DIC e.g. The Eighteenth African Symposium on Horticultural Crops, Wad Medani published in Acta Horticulture 1984.

a. TYPE OF PUBLICATION: [Tables 1,3]

Types of publication include journals, conference papers, theses, reports and books which are considered as carriers of scientific and technological research. The highest rate of productivity is in journals (1129) and specially the foreign ones (785). But as indicated in table 1, the rate of productivity decreased (in comparison to SSA-2, SSA-3) and is due to the difficulty of obtaining foreign currency to acquire journals. Nevertheless, most of the foreign journal are available in DIC as reprints and are included in SSA. I find the reverse situation with books where the rate of productivity steadily increased from SSA-1 up to SSA-12 (0 to 151). The term book is used for whole book as well as parts of books sperately. The high productivity of foreign documents can be explained as they are acquired on the basis of exchange.

Conference papers (which may be symposium/workshop/meeting) rank third. The variations in the data of each issue can be explained by the fact that conferences were presented in Arabic excepting the international ones. The computerised

issues of SSA (SSA-6 to SSA-12) were prepared from the bibliographic database but unfortunately CDS\ISIS Arabic version has not yet been implemented.

Information on theses are obtained either from the author or from files and reports of the Graduate College in the case of the local theses. For the international ones it has not been easy to find a copy with the author's institution. Some of the authors leave to Gulf countries after their study, another reason for the decrease in productivity. DIC has recognised these problems and established a Microfiche Unit for this purpose. DIC also tries with Sudan embassies to get a copy of the thesis from the universities in the countries concerned.

The increase in the number of reports is due to the direction of DIC to include unpublished materials as much as possible.

b. PERSONAL AUTHOR [Table 4]

Personal authors are ranked according to their number in the abstract and sorted as follows:

- some entries do not contain personal authors but includes corporate author
- one author per entry
- two authors per entry
- three authors per entry
- more than three authors per entry, ranging from

4-10 authors.

The analysis showed that most of the citations were to documents by single author (1710), most of entries of SSA being for journal articles and conference proceedings. Majority of authors of SSA are users of DIC. Nearly one third of the authors are foreign indicating interest in Sudan abroad and collaborative research between Sudanese resarchers and foreigners.

c. CATEGORIES OF SUBJECTS [Table 2]

SSA classifies subjects using the Universal Decimal Classification but in this study the abstracts are grouped into the following board categories:

- Social Sciences
- Natural Sciences
- Medical Sciences
- Energy and Technology
- Agricultural Sciences
- Industry

This classification is also useful in the identification of different categories of users i.e. areas of their specialization.

From the analysis it is clear that Social Sciences materials were not included in SSA-1, SSA-2, SSA-3, but there is a gradual increase in coverage in the later issues due to the establishment of DIC, the National Information System for Sudan covering the Social Sciences.

d. TIMELINESS:

Issue number	Date of Publication
SSA-1	1979
SSA-2	1982
SSA-3	1983
SSA-4	1986
SSA-5	1987
SSA-6	1989
SSA-7	1990
SSA-8	1990
SSA-9	1991
SSA-10	1991
SSA-11 (under printing)	1992
SSA-12 (under printing)	1992

From the above table, we can say that SSA to begin with, was published once or twice a year. So the computerization has enabled, accelerated processing and the frequency of publication could be increased to 3 times a year and information about research and studies could be disseminated with greater currency.

e. LANGUAGES

Arabic language is the national language of Sudan and most of the conference papers, some of the reports and journal articles are in Arabic. DIC covers these arabic items in SSA and we find arabic entries as follows:

Issue Number	Number of Entries
SSA-3	78
SSA-4	35
SSA-5	68

For the issues SSA-6 up to SSA-12 were prepared from LIBRI Database but CDS/ISIS Arabic version is not yet implemented.

f. COVERAGE OF "GREY LITERATURE"

Grey literature is defined as government reports on projects proposed or implemented by many foreign agencies in Sudan, theses down to Master level, conference papers even if not published, usually collected from many sources in Khartoum, such as, various ministries and numerous international and nongovernmental agencies working in the country. Formal publishing is still very underdeveloped in Sudan and there is also difficulty in acquiring foreign publications due to insufficient budgets and hard to get foreign exchange.

SSA-1 up to SSA-6 contain all materials published in a definite year (e.g. SSA-2 for the material published in 1980, SSA-3 for 1981). Published material from 1968 upto 1978 also appear in the later issues of SSA mainly reports and books. This shows the concern of DIC with the collection of grey literature.

g. SCATTER OF ARTICLES IN JOURNALS [Table 5]

Scattering of the articles (550) in about 147 journals when they are ranked according to the journal productivity (1979 - 1989) shows the following picture:

Sudan Journal of Veterinary Research	71
Acta Horticulture	64
Fabis Newsletter	54
Sudan Journal of Veterinary Science and Animal Husbandry	32

It is found that Sudan Journal of Veterinary Research ranked first with 71 articles. The four journals listed carried some 50 percent of the papers. About 25 percent of the papers were scattered in some 135 journals. This shows high dispersion of the information on Sudan in different international journals that are not easily accessible to users.

h. ENTRY ELEMENTS AND ARRANGEMENT OF ENTRIES IN SSA

An entry in the main part of SSA usually contains the following elements [Annex 8]

- Class number
- Entry number
- Title
- Author/affiliation
- Host document
- Abstract (at its end the number of references in the orginal paper).

The indexes [Annex 8,9,10,11] are organized as follows:

- Author
- persons

- corporate bodies and conferences
- Subject
- Geographical index

Entries are arranged according to call number (UDC). Each index entry refers to the serial number or entry number in the main part.

SSA arrangement is similar to that in Abstracts on Rural Development in Tropics (International Abstract) but differs in the sequence of subjects.

6.1.2 National Register of Current Research (NRCR)

NRCR is a list of current research in the abroad sense including surveys and doctoral dissertations. The information is compiled from questionnaires as well as from secondary sources. The objective is to identify current research, active sources of expertise among researchers and facilitate communication among researchers, managers of research and funding agencies.

The results presented in tables 6,7 showed that high incidence researches in centres in Khartoum and Central Region and decreasing from Northern to Kordofan to the Eastern region. Most research centres are thus located in Khartoum, such as,

1. National Centre for Research
2. Veterinary Research Centre
3. Sub-bodies of Agricultural Research
4. University of Khartoum

This is followed by Central Region where the Agricultural Research Corporation which is the main body of agricultural research in Sudan as well as the Gezira scheme, Gezira University and other higher educational institution, are located.

The low incidence of researchs in other regions of Sudan where the sub-bodies of Research Centres as well as developmental projects carried out by regional ministries and departments under the supervision of Ministry of Planning are located.

In the distribution of research activity under type of research [Table 8], the figures do not give the actual nature of the activity because most of the researchers were not familiar with the technical terms. So the high frequency under 'not mentioned' (1256).

The analysis shows that most researches are categorized as Applied (444) and Experimental (625).

ARRANGEMENT AND SCOPE OF NRCR

The entry for project description gives the following data elements [Annex 12]:

- Project number
- Name of Parent Research Organization, Name of Research Unit
- Title of Research Project
- Name of the project leader and the co-

investigator(s)

- Starting and completion date
- Indexes [Annex 13, 14, 15, 16]

In comparison to Research Undertaken in Eastern and Southern African [RURESA] (regional directory of ongoing and completed project) its arrangement and scope is similar to those of NRCR with only slight differences. The RURESA includes:

- Translated title
- Academic qualifications of author
- Nationality of author
- Research methodology
- Output

They are prepared from database using CDS/ISIS and CDS/MINISIS in NRCR and RURESA respectively, and available as computerized database for online search and outputs in the form of computer prints and on diskette.

NRCR (NDC database) is an integrated database including different worksheets e.g. "RES" worksheet for project and "INST" for institution.

DIC AND TECHNOLOGY

DIC designed the National Information System which is a repository for Sudanese documents, the database is in machine readable form and microfiche is used for document delivery.

Facilities are being developed in DIC such that if a document is not available or cannot be acquired in hard copy form a microfiche copy will be made.

From analysis of the LIBRI database [Table 9] results show the following:

TYPE OF MATERIAL	Records
SSA in paper form	2120
SSA in fiche form (inhouse)	289
SSA in fiche form (outside)	391
LIB (Library collection in paper form)	1429
TOTAL	4229

6.2 ANALYSIS OF SURVEY QUESTIONNAIRES OF SSA AND NRCR USERS

6.2.1 The questionnaires were analyzed at SISA laboratory using CDS/ISIS software for creating a database named EVAL1 whose data elements correspond to those of the questionnaire as follows:

EVAL1 DATA ELEMENTS	QUESTION NUMBER IN THE QUESTIONNAIRES
1. User Name	1 & 2
2. User code	
3. Institution	3
4. Address	4
5. Specialization	5
6. Work	6
7. Collaboration	7
8. Know of publication	8
9. Publication Get	9
10. Type of publication	
11. Frequency of use	10
12. Publication not seen	10.a
13. Purpose of use	11
14. Description	13.a
15 . Entries	13.b
16. Indexing	13.c
17. Data elements	13.d
18. Presentation	13.e
19. Printing	13.f
20. Publication quality (other)	13.g
21. Article copy	12.a
22. Fiche copy	12.b
23. SDI	12.c

24. Literature search	12.d
25. Bibliography	12.e
26. fiche paper	12.f
27. Other services	12.g
28. Suggested titles	14
29. Recommendation	15

INPUT [DATA ENTRY]:

Data are entered directly via following online worksheets:

EVAL1	is the default worksheet for all the data elements in the questionnaire
SSA	is the worksheet for all data relevant to Sudan Science Abstracts (SSA)
NRCR	is worksheet for all data related to the National Register of Current Research (NRCR)

DATA ELEMENTS:

1. User name

Subfielded

^a name ^b position

e.g ^aAhmed ALi Ahmed^bResearcher

2. User Code

NDC0000

3. Institution

subfielded

^aparent body ^bUnit ^cDepartment

e.g ^aUniversity of Khartoum^bFaculty of Science^cDepartment of Botany

4. Address

5. Specialization

Reaptable field and input as in the questionnaire

6. Work

Repeatable

1	stands for	Research
2	,,	Teaching\Acedamic
3	,,	Commerial
4	,,	information services
5	,,	consutlancy
6	,,	extension service
7	,,	student
8	,,	others

7. Collaboration

Input as in questionnaire

8. To know about NDC publication

Repeatable

1	stands for	saw in NDC Library
2	,,	saw in the institution library
3	,,	saw in another library
4	,,	cited in another document
5	,,	colleagues
6	,,	send by NDC
7	,,	others

9. To receive or get the publication

1	stands for	free
2	,,	purchase
3	,,	exchange for

10. Publication type

Identified by one of these notations SSA or NRCR

11. Frequency of use

1	stands for	frequently
2	,,	occasionally
3	,,	not at all
4	,,	not seen yet

12. Publication not seen because

1	stands for	goes to director
2	,,	is not displayed in the library
3	,,	do not look for it
4	,,	do not go to the library
5	,,	others

13. Purpose of use

1	stands for	supplementing other sources of information
2	,,	review of literature
3	,,	keep upto date on recent research
4	,,	identify related researchers/institutions
5	,,	identify funding agencies
6	,,	others

14. Desciption

The fields: description, entries, indexing, data elements, presentation , printing, article copy, fiche copy, SDI services, literature search, bibliographies, and fiche paper are entered in the order of the priority as follows

1	stands for	very low
2	,,	low
3	,,	medium
4	,,	high
5	,,	very high

15. Other services

Publication quality (other), suggested titles and recommendations are input as in the questionnaire.

Output:

The following output formats have been designed

1. EVAL1
2. SSA1
3. NRCR1
4. USER1

6.2.2 User Profile

[fields 1,2,3,4,5]

The user profile is the core of any current awareness service. User's interests can be identified through this survey. It is to be established according to professional, scientific or technical needs of users. A user profile can

- help in gauging the extent to which users can be serviced by the unit taking into account availablilty of
  - manpower
  - resources for acquisitions
  - information
- setting up current awareness services
- improvement of the services to users
- reappraisal of acquisition policies
- development of personalised services - expert profiles
- selective dissemination information

NATURE OF WORK

NATURE OF WORK [TAG 6]

Nature of Work		No of Hits	%
Research	(1)	29	33.72
Teaching	(2)	15	17.44
Commercial	(3)	0	0
Information	(4)	11	12.44
Consultancy	(5)	7	8.14
Extension	(6)	3	3.49
Student	(7)	0	0

According to the above findings the major user groups in DIC can be categorized as the following

- Researchers (33.72)
- Teaching/Academic (17.44)
- information (12.79)
- consultancy (8.14)
- extension service (3.49)

A shortcoming of this survey, is that not all categories of users were covered, such as, students and commercial i.e questionnaires were distributed but not collected from them.

Most of the users of SSA and NRCR are researchers and post graduate students [Table 11]

FREQUENCY OF USE:

FREQUENCY OF USE

(FIELD TAG 11)

Response	Frequently (1)	Occasional. (2)	Not at all (3)	Not Seen (4)
Hits	15	16	4	3
SSA	8	10	2	2
%	9.30	11.63	2.33	2.33
NRCR	7	6	2	1
%	28.14	6.98	2.33	1.16

The results show frequent use of SSA and NRCR is during the researcher's association or involvement in research.

COME TO KNOW ABOUT NDC PUBLICATIONS

KNOW. OF PUBLICATION [TAG 8]

THROUGH	HITS	%
DIC library (1)	7	8.14
Institution library (2)	19	22.89
Another library (3)	3	3.49
Another document (4)	2	2.33
Colleagues (5)	5	5.81
Sent by NDC (6)	12	13.95
others	1	1.16

DIC publications are normally distributed to all institutions and information centres in Sudan as well as to some information centres outside Sudan and specially to agencies for which DIC is focal point. The responses show that 'saw the publications in their institution library' (22.89 %) and /or 'directly recieved from DIC '(13.95 %) as the more frequent ways in which users come to know about SSA and NRCR.

RECEIVING THE PUBLICATIONS

PUBLICATION GET(TAG 9)

RESPONSE	NO OF HITS	%
Free (1)	24	27.91
Purchase (2)	0	0
Exchange (3)	2	2.33

All institutions inside Sudan received DIC publications free up to 1991 and marketing of DIC publication is still in the experimental stage and 'on exchange' basis are applied to institutions outside the Sudan.

PUBLICATION NOT SEEN

REASON FOR NOT USING PUBLICATIONS (FIELD TAG 12)

RESPONSE	NO OF HITS	%
Goes to director (1)	3	3.49
Not displayed in library (2)	4	4.65
I do not look for it (3)	3	3.49
I do not go to the library (4)	2	2.33
others(5)	2	2.33

DIC usually sends its publications to all institutions through the directors or responsible people expecting their circulation among his/her colleagues in their institution but unfortunately these publication are kept in their offices or in the special collection of the director (3.49%).

I observed in my visits to some of the libraries that these publications are not displayed in a prominent place. When I asked about the publication it seemed that the name of publication was new to the librarian and had to search for it. Also, users complained that they were not made aware of the publications.

The authorities of international/regional organizations have pointed out many times in conferences the problem of non-use of information in many African societies. That is true of our users as well.

PURPOSE OF USE

PURPOSE OF USE (FIELD TAG 13)

RESPONSE	1	2	3	4	5	6
SSA						
HITS	6	10	15	12	0	0
%	6.98	11.63	17.44	13.95	0	0
NRCR						
Hits	6	9	13	10	3	0
%	6.98	10.47	15.12	11.63	3.49	0

NOTE:
1 = supplementing other sources of information;
2 = review of literature;
3 = keep up to date on recent research;
4 = identify related researchers/institutions;
5 = identify funding agencies; and
6 = others

DIC publications are useful to build up information sources and in identifying and accessing unpublished research reports and dissertations in universities and technical graduate schools some of which contain original papers and cannot be acquired through normal trade channels. A majority of the

researchers are in the fields of science and technology. Book reviews contain mainly the results of past research and development. The delays in the publication of many important review periodcals and reviews, notification of research project done is delayed even for a number of years. However, most researchers are informed through NRCR about ongoing research and development. It is also helpful to decision makers in identifying the distribution of funds in different subject areas etc. For funding agencies, NRCR is helpful to locate easily and keep track of the progress of research projects funded by them.

SSA & NRCR QUALITY:

SSA & NRCR QUALITY

RESPONSE	1	2	3	4	5
DESCRIPTION (TAG 15)					
HITS	0	0	13	17	9
%			(15.12)	(19.77)	(10.47)
SSA	0	0	8	9	5
%			(9.30)	(10.47)	(5.81)
NRCR	0	0	5	8	4
%			(5.81)	(9.30)	(4.65)

RESPONSE	1	2	3	4	5
ENTRIES (TAG 15)					
HITS	0	0	9	18	9
%			(10.47)	(20.93)	(10.47)
SSA	0	0	6	7	6
%			(6.14)	(8.14)	(6.98)
NRCR	0	0	3	11	3
%			(3.49)	(12.79)	(3.49)
INDEXING (TAG 16)					
HITS	0	1	13	11	7
%		(1.16)	(15.12)	(12.79)	(8.14)
SSA	0	1	8	4	4
%		(1.16)	(9.30)	(4.65)	(4.65)
NRCR	0	0	5	7	3
%	0	0	(5.81)	(8.14)	(3.49)
DATA ELEMENTS (TAG 17)					
HITS	0	0	8	18	10
			(9.30)	(20.93)	(11.63)
SSA	0	0	4	11	4
			(4.65)	(12.79)	(4.65)
NRCR	0	0	4	7	6
			(4.65)	(8.14)	(6.98)

RESPONSE	1	2	3	4	5
PRESENTATION (TAG 18)					
HITS	0	2	16	12	6
		(2.33)	(18.60)	(13.95)	(6.98)
SSA	0	1	8	8	2
		(1.16)	(9.30)	(9.30)	(2.33)
NRCR	0	1	8	4	4
		(1.16)	(9.30)	(4.65)	(4.65)
PRINTING (TAG 19)					
HITS	0	2	23	4	4
		(2.33)	(26.74)	(4.65)	(4.65)
SSA	0	1	11	4	2
		(1.16)	(12.79)	(4.64)	(2.33)
NRCR	0	1	12	0	2
		(1.16)	(13.95)		(2.33)

NOTE : 1 = VERY LOW; 2 = LOW; 3 = MEDIUM; 4 = HIGH
5 = VERY HIGH

The above table presents data on the views of DIC users regarding the quality of SSA and NRCR. Some users have not expressed any views. A majority consider that DIC publications are good, of high quality in its contents whereas printing

needs improvement. It is a commendable achievement with the limited resources to produce such publications. 'Fair' printing is due to DIC's dependence on and constraints imposed by production schedules and cost of printing, which is unpredictable, to periodic shortages of paper, ink, spare parts for aging machines and even of vagaries of electricity supply to run the machines.

DIC SERVICES:

DIC SERVICE

RESPONSE	1	2	3	4	5
ARTICLE COPY (TAG 21)					
HITS	2	3	5	7	16
%	2.33	3.9	5.81	8.14	18.60
FICHE COPY (TAG 22)					
HITS	6	3	10	3	8
%	6.98	3.49	11.63	3.49	9.30
SDI SERVICES (TAG 23)					
HITS	2	1	7	6	9
%	2.33	1.16	8.14	6.98	10.47
LITERATURE SEARCH (TAG 24)					
HITS	1	1	3	7	19
%	1.16	1.16	3.49	8.14	22.09

RESPONSE	1	2	3	4	5
BIBLIOGRAPHIES (TAG 25)					
HITS	1	2	2	11	13
%	1.16	2.33	2.33	12.79	15.12
FICHE PAPER (TAG 26)					
HITS	6	2	8	5	8
%	6.98	2.33	9.30	5.81	9.30

NOTE : 1 = VERY LOW; 2 = LOW; 3 = MEDIUM; 4 = HIGH
5 = VERY HIGH

DIC is in the process of development of various services. This survey will be helpful in identifing areas to be given priority consideration.

Services ranked according to users' perference

SERVICE	%
Literature search	22.69
Article photocopy	18.60
Bibliographies	15.12
SDI	10.49
Fiche copy	9.30
Fiche paper	9.30

On-line literature search [Tables 9, 10,11, 12]

Computer searches are conducted on the inhouse database, which includes the entire book/report/conference/periodical article and microfiche collection of the DIC and on international data bases such as AGRIS and POPLINE which are available on CD-ROM at DIC.

Searches on the in-house databases, and on CD-ROM are conducted free for all users. Requests for literature searches may be sent by mail or telex (special from INFOTERRA and other international organizations), in addition to making requests personally.

Article photocopy service

A future plan of DIC is to make available the use of phocopying facilities by users themselves. Currently, these can be used by DIC only.

Selective dissemination of information (SDI)

The selective dissemination of information (SDI) service is not yet developed but a proposal is still under consideraton.

Document delivery

Microfiche copies and a limited number of photocopies (up to 30 pages) are provided free to users upon request.

Publications

Accession bulletin is published quarterly and lists documents received by the library. Geographical, subject and author indexes of documents collected on microfiche are provided. These are free to Units of National Centre of Research.

Bibliographies

Selected bibliographies with annotation on topics of particular interest to users are provided.

Suggested title

Most responses suggested titles of periodicals in their own fields of specialization.

Suggestions & recommendations

- motivation for more effective collaboration
- strengthening the relationship with users and specially the researchers
- encouraging refresher courses at national level about the developments in DIC, education and training of users
- unifying policies and standards at national level
- arabization of the system
- compilation of union lists of serials and databases in Sudan

- strengthening capabilities of main libraries in different fields of science and technology
- ensuring professional training for information and library staff
- acquiring standard and compatible computer equipment
- enhancing electronic communication among members of the national network
- updating mailing list
- improvement of the environment of DICs' library and search services

Only one negative response from one user who does not use DIC facilities, that DIC publications are often missing, NRCR as well as DIC are not functioning well, but the user did not mention the reasons.

6.3 ANALYSIS OF THE SURVEY OF NATIONAL COMPUTING CENTRE

COMPUTER COMPONENTS

NAME	TYPE	NUMBER	Remarks
software	50	115	Two locally developed dominated by DBASE(16), lotus (15) and word processing (14)
operating system	29	73	mainly MS-DOS versions (27)
hardware	18	287	IBM computers (220)
utilities	26	56	NORTON (7)
printers	14	113	EPSON models (79)
compilers & interpreters (7)	11	98	BASIC (27), COBAL(23), FORTRAN (7), RPGII PASCAL (4).
assembler	4	6	

COMPUTER USER CATEGORIES

TITLE	NUMBER
system mangers	31
system analysts	35
programmers	93
operators	246
hardware technicians	10
hardware engineers	17

ACQUIRED COMPUTERS
[1980 -1991]

YEAR	NUMBER
1980	35
1981	2
1982	25
1983	7
1984	9
1985	11
1986	13
1987	10
1988	95
1989	41
1990	16
1991	27

LOCATON OF COMPUTERS

ORGANIZATION TYPE	NUMBER
public organization	22
banks	20
research centres	3
companies	19
foreign organization	1
higher education	2

Computer technology makes it possible to collect, store, manipulate and transmit data in dfferent environments: banking and business transactions, government records and statistics, or medical and other technical information etc.

Computers were introduced since 1967 and not yet utilized in a proper way and the progress is slow. In 1980's, the importance of this technology in data processing specially mini/micro computers was realized. There is no policy or guidlines on informatics in Sudan as yet and also most of those that acquired this technology are not aware of the value of information networking. In comparison with the survey carried out in June 1986 by DIC, all institutions are not covered in this survey and concentrated in Khartoum.
There is a considerable number of computers specially in public organizations and research centres which can support local area network for scientific and technical information.

6.4 ANALYSIS OF THE SURVEY CARRIED OUT BY DIC AND THE BRITISH COUNCIL [Table 13]

The aim of the study was to survey library infrastructure in Sudan and also to ensure that these libraries for processing scientific and technical information are efficiently equipped and managed. Sample data collected by this survey was analyzed and it showed that information technologies have not been introduced. In some of the

institutions there is a separate computer centre which may not used by the library. Some of the special libraries are managed by personnel who do have not a background in library techniques. I hope the results of this survey will be available soon and help those libraries in the DIC network to become aware of the deteriorating situation and appropriate action will be taken.

6.5 DISCUSSION WITH USERS AND INFORMATION SPECIALISTS

Discussions were carried out with managers, decision makers in the information field and with some users of SSA and NRCR. The responses of these information specialists and users indicated in the following:

- the existing system of DIC is hindered by such constraints as:
    a. staff working in the newly created computer, micrographic and bindery section are project staff who do not have permanent posts;
    b. loss of staff when they acquire training or experience (brain drain);
    c. scarcity of resources especially foreign currency;
    d. institutional instability, the affiliation of National Centre for Research, the parent organization of DIC has changed several times;

and

e. DIC is not an autonomous centre but only one of the Units of National Centre for Research.

- different aspects of telecommunication in Sudan is so poor that does not help transmission of information within or out of the Sudan. The current telephones and microwave units are unfit to develop networks among different information systems in Sudan.

- the basics of National Information System are supported by:
  i. Collaboration of
     a. users who are mainly researchers, consultants, salesmen, farmers, academic staff, etc...
     b. sources of information which are publishers, companies, research institutions, etc..
  ii. Recognition of information as a national resource.
  iii. Study the infrastructure of information centres and units.
- the importance of the role of the National Committee for Information (steering committee belongs to NRC) as coordinating mechanism directing future plans which include sectoral/regional/international networks.
- a productive national information centre which can disseminate information to a large number of users.

- the poor state of libraries, documentation, information centres and national archives is due to:
    - lack of awareness about new technologies
    - poor document delivery system and telecommunication infrastructure
    - poor status of information professionals in Sudan and therefore they migrate to Gulf countries such as Kuwait, Saudi arabia and recently Oman for better pay
    - Information is a neglected area in the country's polices and funding/programmes.
- The need for integrated system. The components of the national integrated system faces problems in Africa and specially in Sudan. These are:
    - lack of regulations on standards in information handling
    - barriers to communication - administrative, language etc..
    - hard currency.
- Collaboration with PADIS, DIC [acts as national focal point of PADIS]:
    - DIC like any other national focal point in PADIS gets technical assistance, fellowships and group training
    - DIC supports PADIS information system by sending its information outputs regularly

- Repetition of training for DIC staff

- Sudanese databases, products and services meet the needs of the users
- Sudanese publications (SSA and NRCR), do not always carry every thing actually produced in Sudan.
- Suggestions to DIC:
  - to neutralize the limitations that hinder the development of its activities
  - to study why information is not effectively used
  - to strengthen the invisible college system
  - to benefit from the experiment of Egypt in developing a national coordinated integrated system serving decison makers, researcher etc...
  - to consolidate and coordinate its activities on the national databases and focal point activities
  - to promote user services including CD-ROM services.
  - to develop DIC into a National Council for Information to introduce such functions as co-ordination, formation of information units, put standards, norms and legislation as well as information policies etc.. into the national system
  - To overcome institutional instability all national information systems to be under the supervision of Ministry of Planning where the decisions are taken and development plans are formulated.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

7.1 KEY FACTORS AFFECTING THE PROGRESS OF THE DIC SYSTEM:

There are several problems and obstacles affecting the smooth operation of the DIC system:

7.1.1 Inadequacy of Resources

By far the most important obstacle to the overall development of information services is the inadequacy of resources which is human, finance and material. The main reason for these inadequacies is the low priority and importance attached to the field by government in relation to the developmental programmes.

7.1.2 Shortage of Personnel

Lack of middle level information specialists and technicians needed to maintain and operate computers, reprographic equipments and other information technologies. Also DIC suffers from brain drain which make continuous training essential to fill the gaps.

7.1.3 Financial constraints

Sudan is experiencing acute shortage of finance, especially shortage of hard currency which limits the provision of information sources and services. At the same time, competition for imported items in short supply has driven prices to such high levels placing them beyond the reach of most local institutions, unless the institution received foreign assistance or tax exemption. As a result information systems and centres have greatly suffered and many have all but given up trying to keep up with the increasing cost of foreign materials. For instance, DIC and Khartoum University have not been able to subscribe to some of the international periodicals since 1983.

An important function of DIC is to provide information support for the advancement of knowledge. Doctors, engineers, entrepeneurs and other professionals need information in their respective areas of activity. In order to provide information on current developments in different areas of specialization, it is necessary to have adequate funds to acquire and access appropriate information sources much of which in the fields of science and technology are generated in the advanced countries. Availability of adequate foreign exchange to DIC is thus crucial if it is to discharge its functions effectively and efficiently.

Information also has a vital role in decision making, planning and plan implementation and management from the highest

authorities in the government to the grass roots level. To provide information support to decision making and planning DIC must acquire all appropriate information sources, create databases and information system not only to serve present demands but for the future as well. This task of building up the information resources and systems must be done now, for tomorrow it may be too late when the prices would have gone up even further. In this regard information professionals of the country must cooperate rather than compete with each other in duplicating effort and consequent wastage of scarce resources.

7.1.4 Operational problems

7.1.4.1 use of computers and other information technologies in Sudan raises problems such as the following:

1. The very hot dry and dusty climate makes a reliable air conditioning a necessity; but as air conditioners are not manufactured in Sudan, they must be imported using the valuable and scarce hard currency. It is difficult to quantify the consequence of less efficient cooling systems; it is, however, recognized that if the machine fails often the spare part must be ordered from abroad.

Khartoum is subjected to sandstorms; so special structural provisions are needed in buildings where computers are used and also to enure that air conditioning system does not draw

dust into the computer room.

2. Fluctuations in the power supply necessitate the use of un-interrupted power supply units and stabilizers. All these provisions raise the cost of maintenance.

3. Maintenance of equipment becomes a serious problem where machine installation planning has been poor and local agents cannot be relied upon to stock spare parts, to know how to repair faulty machines which local companies may not have dealt with.

4. Lack of trained personnel is a major constraint as already mentioned, and in the area of the software:

- there is a lack of representation of software internally;
- language of software with the associated; documentation is normally English, but DIC requires also Arabic versions; and
- DIC lacks funds for training staff in information technology

7.1.4.2 Microforms

The main limitation of the Microfiche unit regarding the number of documents filmed lies in the speed at which they

can be catalogued rather than in the limitations of the production facilities. Other factors which have a bearing on this are arrangements for procuring documents on film, availability of transport or fuel to move the camera or bring documents, electricity supply etc. The internal limitations include lack of supplies, supplies damaged due to storage conditions, failure of equipment etc. At the time of writing supplies were not available in Sudan. [Weyers, Oct 1990]

7.1.5 Poor document delivery system [Wesley, May 1991]

A. Ineffective Legal Deposit

The only way to get needed local documents is to visit other centres and offices on a regular basis, and some of the centres are not properly organized and managed.

B. Again, the scarcity of funds for acquisitions, poor communication and the lack of equipment, add to the problem of document delivery.

7.1.6 Absence of information marketing strategies for DIC publications and therefore of information itself.

7.1.7 Absence of information research policy

Since 1973 NCR acts as advisor and consultant in matters related to scientific research. Unfortunately the information sector is not involved in the research programmes and plans.

In December 1991, one of the functions which assigned to DIC is to carry out research. There is no research policy at present to help in improving the supply and use of information services and products. The application and implications of information technology constitute useful area of research.

7.1.8 Satisfying users and promoting use

Since its establishment, DIC has only been concerned with the development of the services and products and the users have been neglected regarding familiarization with information systems and services and specially now computer-based systems.

7.1.9 Integrated system

DIC has recognised the importance of integrated system but the subsystems of DIC are not yet automated.

7.1.10 Control and security

There is no control and security plans and programmes for DIC system and specially for the computer system.

7.1.11 Network

1. The services offered by most libraries and documentation centres in the network are lacking in proven services, such as SDI, and are largely unavailable. Advanced services such as information repackaging and state-of-art reviews though they may the most appropriate to particular needs, are still

unheard of.

2. Sudan does not produce a national bibliography therefore is not contributing to national bibliographic control.

3. Absence of a standard policy on the confidentiality of documents restrict the free flow of information that may be freely available within government departments from which these originate.

7.2 SOME SUGGESTED MEASURES

The following measures are suggested to neutralize some of the constraints and enhance the usefulness of these services and products :

7.2.1 To meet the actual and immediate needs of different categories of users by developing appropriate information products and services especially for decicion makers (Annex 17) before they turn to the developed countries. Such decision support system calls for

- knowledge of the subjects or fields of operation of the clientele served in preparing the value-added information products and services;
- interface, interaction and working with subject; specialists in the provision of information products and services;
- knowledge about a wide range of information and data

sources and systems in the users interest areas; and

- knowledge of methodology and techniques of information analysis, consolidation and repackaging, as well those for developing intelligent knowledge based system and expert systems.

A list of the information products and services useful to DIC users is presented in table 14.

The recommended DIC INTEGRATED INFORMATION MANAGEMENT SYSTEM (DICIMS) will be composed of the following modules:

- acquisitions;
- cataloguing;
- thesaures development and maintenance;
- circulation control;
- serials control;
- interlibrary lending;
- databridge, a facility for downloading MARC records;
- databases of profiles of users, institutions, projects, information systems and experts;
- statistical and numerical databanks; and
- information services.

The system operates using different databases for each module, such that it is possible for each module to stand alone, data being transferred between modules at various stages in the processing, so that it is not necessary to re-

key data. Each module is called up separately by the system (although a high level menu can be inserted to guide the user to move from one function to another). However, some facilities are shared and common to all modules notably the online catalogue and certain other databases.

The system is menu-driven throughout, with no command options to allow direct access to a function, but the system does permit typing ahead, so that users can by pass intermediate menu displays. It is also possible to use the function keys facility to store a given key sequence to give quick access to particular tasks and avoid unnecessary keying. Each main menu is in two parts one for the various sub-functions relating to the function itself, and one for various systems utilities which allows for basic functions such as ADD, Update etc, and also for access to menu for other relevant files within the function (e.g. vendor and accounts within the acquisitions) and to the various enquiry functions. There is also a general utility menu for each module which allows various kinds of user-definition, e.g. changing fields names, setting up functions keys (up to 32 per module) One function key which is predefined is the help key for all modules. Help is context- specific and displayed as windows on the screen. Help is standard on the system, apart from the online catalogue which is totally user-defined.

Each function within a menu is password protected (one password across system). It is also possible to set up enquiry

From the system analysis it is seen that DIC has a acute shortage of funds to acquire a new system. Natuarlly it is required to integrate the system by using the existing facilities which is less expensive and less time consuming.

In this regard, the future expansion of the system can be seen from two angles. The first one is to have a LAN/WAN with file server(s). Since the existing LAN/WAN systems have problems in flexibility and growth, care should be taken in selecting the LAN system.

I recommend DICIMS for the DIC's future expansion because

1. compatibility of the system with most other systems;
2. the availability of various softwares which can run on it;
3. the flexibility of the computer system; and
4. that it is cheaper as compared to a minicomputer system and a LAN system.

From the above description we can appreciate that the established databases of DICIMS will have different types of records. For the fact that the data elements for each database record is known or identified and most of them are common to all/some records there is no need to identify and describe them independently rather they are described as a whole. This implies that all data elements which are included in the

only access.

The various DOS utilities can be used to back up to floppy disks, or a tape streamer can be built into the menu structure for the applications software.

DICIMS runs under MS-DOS on IBM PCs or compatible multi-user capability available through networking. Any network software, such as Novell Netware supported by Dos 3.1 or above may be used.

Modules are available separately (each module has its own database) or as an integrated system. Also local area network (single fileserver) per LAN for 16 plus workstations.

Training is provided at DIC. There is a single point of contact for both hardware and software problems. The supplier can then identify if the problem is hardware related, and advise the hardware maintenance contractors accordingly. Hot-line support is provided.

CDS/ISIS has the ability to handle the bibliographic information of the integrated system. User exits can be provided as one needs by using CDS/ISIS PASCAL.

It has been developed for use as a text database management system for CD-ROM . This implies that the values of data elements of databases can be exported to CDS/ISIS database.

DICIMS database are described regardless of the record(s) in which they may occur.

The inputs come from the DIC system, the database from different sources, either imported from CD-ROM databases or from local/regional/international databases. The programs of for converting data formats from other databases to CDS/ISIS database should be prepared (such a program called GENBIBCON is now available) and each program (module) needs special specifications; or come from a completed input worksheets and entered into the database from the keyboard by operator(s). Manuals should be prepared to help the staff in different sections to fill specific input worksheets. Generally, the data elements included in the input and their characteristics will be identified in a data dictionary.

Developing the integrated DICIMS system requires:

1. Resources

   - Physical resources

     includes hardware and software.To start with available resources and after integration has been tested, it requires work stations in different sections of DIC, nodes of DIC network and NCR institutions; and

   - Human resources

     personnel who will be involved in the online

integrated system are :

- project manager
- system analyst
- computer operators
- individuals from the DIC network institutions and also from NRC institutions (at least two).

2. Conversion Plan

Conversion of record formats of other databases which are either on CD-ROM or floppy disks to DICIMS databases is accomplished through conversion program. Such type of conversion is very limited as compared to keying in from keyboard including data elements not available in the imported databases.

Generally the conversion can be made as follows:

- conversion of the original records to suit DIC database format which is in ISO 2709 format using special programs for such purpose.
- Use conversion format to download to DIC database

3. Orientation and Training of users

DIC with the collaboration of PADIS, ALDOC,IDRC and UNESCO can arrange training and orientation for the users about the importance, effectiveness and efficiency of using online integrated system. This should be done even as the project is implemented.

4. Interface

Interface is the communication between DIC system user and computer system. The purpose behind the interface is to make the task of locating or finding information easy.

The purpose of the online integrated system and the user interface are:

1. To accommodate users with varying degrees of familiarity with the online system.
2. To treat user as a layman and not necessarily as one who is a computer literate.
3. To give the user consistent results.

Concerning the interface between end-user and the system the DIC system should prepare an interface computer program with CDS/ISIS software package to help the user to fulfil the above mentioned purposes of the online integrated system.

Programs should available :

1. To generate printed catalogues, current awareness bulletin, bibliographic indexes, purchase order and claim notices, list of supplier authority file from DICIMS database.
2. To provide punctuation for corporate names.
3. To ensure correct indentation of literals.
4. For resequencing and renumbering records in the database for printing out bibliographic indexes.

5. For use with renumbered records to eliminate references to other records not present in the renumbered database.
6. For macrotheasurus maintenance, searching and editing.
7. For maintenance, editing and searching.
8. For editing ,correcting and introducing strings of characters in several records.
9. To identify libraries holding specific periodical titles and generate an interlibrary loan request.
10. To display names of input/output formats of database in window and enable the selection of required format.
11. To provide selective dissemination of information services by matching users' interest profiles with records.

7.2.2 Central Coordinating body

Recommend that DIC be central coordinating body with the following functions:

1. Coordinating activities of information and documentation centres in the country.
2. Encouraging and supporting various professional associations connected with information.
3. Advising government on the formulation and legislation of national information policy and its implementation.
4. Serving as focal point and clearing house for requests and duplicates exchanges.

5. Facilitating links between generators and users of information.
6. Coordinating and providing of advice relating to standardization in information.
7. Advising on indigenous information production and distribution.
8. Monitoring the designated centres and encouraging them to respond positively to policy creating a national information coordinating mechanism.
9. Encouraging cooperation among information institutions and information industry to ensure and channelize the supply, the much needed information for social and economic development of the country.

BIBLIOGRAPHY

1. Abidi, S.A.H and Huttaman, L (eds.) 1990. Development of Information and Documentation Network for Uganda. Papers of Seminars held in Kampala, 1 - 9 , March 1990. Bonn: DSE.

2. Akhtar, Shahid (ed.) 1990. National Information and Informatics Policies in Africa. Report and Proceedings of a Regional Seminar held in Addis Ababa, Ethiopia, 25 Nov - 1 Dec 1988. Ottowa: IDRC.

3. Anon. 1983. Strengthening the National Documentation Centre, Khartoum, Government of Democratic Republic of Sudan. (restricted report). Paris: UNESCO.

4. Atherton, Pauline. 1975. A Handbook for Information Systems and Services. Paris: UNESCO.

5. Baark, E. 1986. Context of National Information Systems in Developing Countries: India, and China in Comparative Perspective. Lund: Research Policy Institute.

6. Barlag, T. 1977. Sudan Science and Technology Policy, Planning and Management: Research In Universities. Paris: UNESCO.

7. Bassit, Ahmed A. 1988. Experiences of North African Countries in Formulating National Information Policies. In Regional Seminar on National Information and Informatics in Africa, held at Addis Ababa, 28 Nov - 1 Dec.

8. Bawden, David. 1990. User-oriented Evaluation of Information Systems and services. Brookfield: Gower.

9. Board on Science and Technology for Information Development (BOSTID) 1989. Science and Technology Information Services and Systems in Africa: report of Workshop, Nairobi, 19 - 22 April. Nairobi : BOSTID.

10. Clarke, John I and et al (eds.) 1985. Population and Development in Africa. Cambridge: Cambridge University Press.

11. Creasy, J. C. 1982. The Collection and Use of Research Project Information: the Democratic Republic of the Sudan. (restricted report). Paris: UNESCO.

12. Creasy, J. C. 1983. Development of National Register of Research: the Democratic Republic of Sudan. (restricted report). Paris: UNESCO.

13. Cronin, Blaise 1981. The Marketing of Library and Information Services . A reader in Aslib Series. London: Aslib.

14. Douglas, A. S. 1977. Science and Technology Policy, Planning and Management in Sudan: Computer Applications. Paris: UNESCO.

15. El Rayah, Abel Raheem. 1989. Towards national information policy. In National Scientific Conference on Policies, Programmes and Priorities of the Country in Scientific Research : Information Sector, Khartoum, 2-4 April (ARABIC).

16. FID/DC Working Group 1975. Function and Organization of a National Documentation Centre in Developing Countries. Paris: UNESCO.

17. Ghobrial, Rafaa Ashamallah. 1992. SISA Course INST 663: Systems Analysis on the Integrated Information System of National Documentation Centre (NDC), Khartoum, Sudan. (unpublished report). Addis Ababa: SISA.

18. Ghobrial, Rafaa Ashamallah. 1991. QUICK AND MTHES: Pascal Interface for Micro CDS/ISIS. (Unpublished). Addis Ababa: SISA

19. Gray, John. 1988. National Information Policies: Problem and Progress. London: Mansell.

20. Gunn, R.H. 1977. Science and Technology Policy,Planning and Management in Sudan: Survey of Natural Resources. (restricted report). Paris: UNESCO.

21. Howden, Norman. 1989. Local area network management: An unresolved issue. Microcomputers for Information Management 6(4): 281 -291.

22. Huttamann, Lutz 1986. Report of Coordination and Improvement of National Information Services: Mababane and Maseru Workshop Papers. Mababane/ Swaziland 24-26 February 1986 and Maseru/Lesotho 3-7 March 1986. Bonn: DSE.

23. Inganji, Francis. 1988. Building Efficient Science and Technology Information Systems in Developing countries. In Conference on Science and Technology Policy In Ethiopia, Science and Technology Commission held at Addis Ababa, June, 1988.

24. Istasi, Cecil Wesley. 1976. Planning Guidelines for a National Scientific and Technological Information System in Sudan. Ph.D. diss. University of Pittsburgh, Pittsburgh .

25. King, D. W. and Bryant, E. C. 1971. The evaluation of Information Services and Products. Washington: Information Resources.

26. Lancaster, F. W. 1978. Guidelines for the Evaluation of Information Systems and Services. Paris: UNESCO.

27. Lancaster, F. W. and Cleverdon, C. W. 1977. Evaluation and Scientific Management of Libraries and Information Centres. Leyden: Neordoff.

28. Lancaster, F. W 1979. Information Retrieval Systems Characteristics, Testing an evaluation. New York: Wiley.

29. Lindely, D. K. 1983. Developing a National Environmental Data and Information System for Sudan. (assignment report). Paris: UNESCO.

30. Migration of Five Million Sudanese. 1992. In EL Majalla (Arabic Magazine) (629): 58-60.

31. Mamoun, Izz El Din. 1972. Present and Possible Future of Librarianship in Sudan. In International Librarianship, IFLA Seminar for Developing Countries held in London 1971, ed. by G. Ghandler, 27-32. London: IFLA.

32. Mohamed, Radia Adam. 1989. Information Infrastructure. In National Scientific Conference on Policies, Progra-mmes and Priorities of the Country in Scientific Research : Information Sector, Khartoum, 2-4 April 1989 (ARABIC).

33. The National Council for Research Act 1973, Democratic Republic of Sudan. Khartoum: National Council For Research (ARABIC).

34. The National Documentation Centre 1987. Memorandum of Grant Conditions: to scientific and technical information system for Sudan, Khartoum, 18 September 1987. (restricted document).

35. The National Documentation Centre. 1980. Sudan Science Abstracts, vol 1. Khartoum: National Documentation Centre.

36. Niblock, Tim. 1987. Class and power in Sudan: the Dynamics of Sudanese politics 1898 - 1985. London: Macmillan Press.

37. Nimeiri, Sayed. 1976. The Five Year Plan 1970 - 1975: some Aspects of the Plan and its Performance. Khartoum: DSRC.

38. Parker, J. S. 1972. Development of Library and Documentation Services: Democratic Republic of Sudan. (restricted report). Paris: UNESCO.

39. Ravichandra, RAO I. K. 1980. Quantitative methods for Library and Iformation Science. New Delhi: Wiley Eastern.

40. Rorissa, Abebe and et al. 1991. ABNCD+: A Prototype for an Integrated Information Storage and Retrieval System. (unpublished). Addis Ababa: School of Information Studies for Africa.

41. Samaha, E. 1978. A Study on the Application of Scientific and Technological Information in Development: Field of Study in Tanzania. Paris: UNESCO.

42. Sewell, P.H. 1961. The development of library services in Sudan. UNESCO Bulletin for Libraries 15(2): 87-90.

43. Sewell, P. H. 1979. Developing an Information System for Sudan. (restricted report). Paris: UNESCO.

44. Suchman, E. A. 1967. Evaluative Research. New York: Russell Sage Foundation.

45. Swanson, R. W. 1975. Performing evaluation studies in information science. Journal of the American Society for Information Science 26: 140-156.

46. Wesley, Cecil. 1986. Survey of Databases in Science and Technology with Special Reference to Environment, Water and Desertification in Western Sudan. (Report). Khartoum: National Documentation Centre.

47. Wesley, Cecil and Weyers, Richard. 1990. Appropriate information systems in developing countries: case of The Sudan. In International Symposium on the Future of Scientific & Technological, Industrial Information Services held at Leningrand, USSR, 28-31 May 1990.

48. Weyers, Richard. 1989. The National Documentation Centre. Link up 1 4): 5-9.

49. Weyers, Richard. 1989. Sudan's National Documentation Centre. African Research and Documentation (49): 10-15

50. Yousif, Awad El Karim Mohamed. 1989. Information Status in Sudan. In National Scientific Conference on Policies, Programmes and Priorities of the Country in Scientific Research : Information Sector, Khartoum, 2-4 April (ARABIC).

51. Yousif, H. M. O. 1986. Educational planning and policies in the Sudan. MPA. Thesis. University of Liverpool. Liverpool.

TABLE 1

DISTRIBUTION OF PUBLICATION TYPE IN SSA ISSUES

[SSA-1 - SSA-8]

SSA ISSUE	PER	COD	THE	REP	BOOK
SSA-1	66	25	23	1	0
SSA-2	183	82	99	13	14
SSA-3	202	39	93	9	63
SSA-4	177	122	107	21	58
SSA-5	201	103	88	10	79
SSA-6	128	54	72	32	114
SSA-7	80	21	45	77	177
SSA-8	92	57	14	86	151
TOTAL	1129	403	541	249	656
%	36.68	16.34	117.47	8.09	21.31

PER = PERIODICAL ARTICLE THE = THESIS

COD = CONFERENCE PAPER REP = REPORT

BOOK = CHAPTER/WHOLE BOOK

SSA-1 (2, 3, 4, 5, 6, 7, 8) = Sudan Science Abstracts volume 1. i.e the number refers to issue number

TABLE 2

DISTRIBUTION OF ABSTRACTS ACCORDING TO THE FIELDS OF SCIENCE IN SSA ISSUES [SSA-1 - SSA-8]

SSA ISSUES	MATH & SCI	MED	ENGNG	AGRIC	INDUS	SOC
SSA-1	23	41	2	29	20	0
SSA-2	73	101	20	182	15	0
SSA-3	61	67	41	210	28	0
SSA-4	59	63	39	345	20	8
SSA-5	27	50	32	345	20	8
SSA-6	72	37	28	217	30	15
SSA-7	39	26	78	124	37	96
SSA-8	41	53	128	125	12	41
TOTAL	395	438	368	1525	188	167
%	12.82	14.22	11.95	49.45	6.10	5.42

MATH & SCI = MATHEMATICS & NATURAL SCIENCE
MED = MEDICAL SCIENCE
ENGNG = ENGINEERING & TECHNOLOGY
AGRIC = AGRICULTURAL SCIENCES
INDUS = INDUSTRY
SOC = SOCIAL SCIENCES

TABLE 3

DISTRIBUTION OF LOCAL AND FOREIGN TYPE OF PUBLICATION

1979 - 1989

[SSA-1 - SSA-8]

YEAR	PER		COD		THE		BOOK		TOTA
	L	F	L	F	L	F	L	F	L
1979	50	134	42	11	35	13	13	4	328
1980	15	138	50	19	3	28	27	6	319
1981	46	107	32	5	84	10	41	35	391
1982	55	103	106	20	77	44	28	44	511
1983	48	98	92	10	78	14	83	30	485
1984	66	106	4	7	6	96	103	32	429
1985	18	26	1	11	4	-	41	21	133
1986	19	25	7	3	7	13	17	9	109
1987	17	20	16	1	36	2	21	12	136
1988	1	15	63	1	8	2	37	7	149
1989	9	11	1	1	-	-	37	4	45
TOTAL	344	785	14	89	430	111	415	204	3035

PER = PERIODICAL ARTICLE

REP = REPORT

COD = CONFERENCE PAPER

L = Sudanese Publications

F = Foreign Publicatons

THE = THESIS

BOOK = CHAPTER/WHOLE BOOK

TABLE 4

DISTRIBUTION OF AUTHOR(S) PER ENTRY IN
SSA ISSUES IN 1979 - 1989
[SSA-1 - SSA-8]

YEAR	0	1	2	3	>3	F	L
1979	20	173	72	35	28	186	142
1980	37	177	63	31	11	98	221
1981	28	267	47	32	17	190	201
1982	34	312	87	53	25	161	350
1983	83	281	59	38	24	101	384
1984	29	248	80	53	17	160	269
1985	26	56	19	13	19	47	86
1986	13	46	27	15	8	31	78
1987	24	74	14	17	7	29	107
1988	36	66	37	5	5	39	110
1989	27	10	3	3	2	7	38
TOTAL	356	1710	508	297	164	1051	1984
%	11.73	56.34	16.74	9.79	5.37	34.63	65.37

1 = ONE PERSONAL AUTHOR >3 = MORE THAN THREE UTHORS
2 = TWO PERSONAL AUTHORS F = FOREIGN AUTHORS
3 = THREE PERSONAL AUTHORS L = SUDANESE AUTHORS

TABLE 5

SCATTERING OF ARTICLES IN JOURNALS

IN SSA ISSUES [1989 - 1989]

NUMBER OF JOURNALS	NUMBER OF ARTICLES PER JOURNAL
71	1
30	2
15	3
7	4
5	5
3	7
3	8
7	9
3	10
2	11, 36
1	12, 13, 15, 17, 20, 26, 27, 28, 31, 36, 40, 54, 64, 71
TOTAL 147	550

TABLE 6

DISTRIBUTION OF RESEARCH PROJECTS BY SECTORS ANI FIELD OF SCIENCES IN NRCR-1, NRCR-S, NRCR,3

RESEARCH CENTRES

FIELD OF SCIENCE	RES	EDUC	PUB	FORE	TOTAL
Agricultural Sciences	1858	246	124	141	2369
Arts & Humanities	19	108	186	32	445
Engineering & Technology	57	122	85	51	314
Mathematic & Natural Sciences	36	117	55	68	276
Medical Sciences	83	161	96	35	373
Social Sciences	37	107	152	89	385
Total	2090	861	689	416	

RES = RESEARCH CENTRE
EDUC = HIGHER EDUCATION
PUB = PUBLIC ORGANIZATION
FORE = FOREIGN ORGANIZATION

NRCR-1(-S, 2) = NATIONAL REGISTER CURRENT RESEARCH (Number refer to issue number)

TABLE 7

DISTRIBUTION OF RESEARCH PROJECT BY REGION IN NRCR ISSUES

NRCR ISSUES

REGION	NRCR-1	NRCR-2	NRCR-3	TOTAL
CENTRAL	367	480	111	958
DARFUR	-	9	18	27
EASTERN	27	14	22	63
KHARTOUM	556	441	139	1136
KORDOFAN	38	132	50	220
NORTHERN	133	158	43	336
SOUTHERN	14	10	31	55
FOREIGN	137	58	72	267

TABLE 8

DISTRIBUTION OF RESEARCH PROJECT BY FIELD OF ACTIVITY IN NRCR-1 & NRCR-2

TYPE OF ACTIVITY	NRCR-1	NRCR-2	TOTAL
Applied	266	178	444
Experimental	586	39	625
Fundamental	106	3	109
Combination	48	-	48
Not mentioned	266	990	1256

TABLE 9

DISTRIBUTION OF TYPE OF PUBLICATION IN SSA ISSUES IN LIBRI DATABASE [SSA-6 - SSA-12]

SSA ISSUES	PAR	REF	REP	COD	THE	PER	TOTAL
SSA-6	0	119	33	38	72	138	400
SSA-7	13	138	102	17	47	81	398
SSA-8	5	119	130	45	16	85	400
SSA-9	11	129	73	47	43	96	399
SSA-10	11	70	64	35	43	170	393
SSA-11	13	87	67	20	45	167	399
SSA-12	13	78	84	15	4	206	400
TOTAL	66	740	553	217	270	943	2789

THE = THESIS

PER = PERIODICAL ARTICLE

COD = CONFERENCE PAPER

PAR = CHAPTER, PART OF SECTION

REF = REFERENCE

TABLE 10

REQUESTS FOR COMPUTER SEARCH AGAINST SUBJECT AREA

FIELD OF SCIENCE	1989	1990	1991	1992	TOTAL
SOCIAL SCIENCE	2	9	32	5	48
ARTS AND HUMANITIES	-	-	-		
NATURAL SCIENCE	-	2	2	-	6
APPLIED SCIENCE	2	27	29	12	70
TECHNOLOGY & MANAGEMENT	-	3	2	1	6
TOTAL	4	41	67	19	132

TABLE 11

REQUESTS FOR COMPUTER SEARCH

AGAINST USERS CATEGORIES

USER CATEGORY	REQUESTS
STUDENTS	52
RESEARCHERS	35
NOT MENTIONED	24
CONSULTANT/ADVISOR	11
ADMINISTRATOR/DIRECTOR	9
REPORTER	1
TOTAL	132

TABLE 12

REQUESTS FOR COMPUTER SEARCH

AGAINST INSTITUTION CATEGORY

INSTITUTION CATEGORY	REQUESTS
HIGHER EDUCATION	71
FOREIGN ORGANIZATION	18
RESEARCH CENTRE	16
PUBLIC ORGANIZATIONS	2
SOCIETIES	2
NOT MENTIONED	11
TOTAL	132

TABLE 13

LIBRARY INFRASTRUCTURE IN KHARTOUM

1991

LIBRARY	STOCK						LANGUAGE			STAFF			
	PER.	BOOK	FIC	FIL	M	N	AR	EN	O	GL	G	C	CL
							%						
ACADEMIC LIB.	5481	831,996	3	515			6	93	1	28	23	74	23
ARCHIVES	5000	5000	5	1000			80	10	10	3	1	1	1
SPECIAL LIB.	44,581	185,705	1	113	200	12	5	93	2	14	13	23	6

PER = PERIODICALS

FIC = FICHE

FIL = FILM

M = MAPS

G = GRADUATE LIBRARIAN

N = NEWSPARR

AR = ARABIC LANGUAGE

EN = ENGLISH LANGUAGE

O = OTHER LANGUAGES

C = CLERK

Table 14: INFORMATION SERVICE TYPE

INFORMATION SERVICE TYPE	Dominant user Groups			
	TM	R&D	MM	TECH
REFERENCE SERVICES				
Reference service	*	*	*	*
Retrospective search	*	*	*	*
Technical enquire service	*	*	*	*
Clearing house service	*	*	*	*
CURRENT AWARENESS SERVICES				
Current papers notification	*	*	*	*
Research in progress notification		*	*	
Selective dissemination (SDI)	*	*	*	*
Current events notification	*	*	*	
Newsbriefs and bulletins	*		*	*
Patents notification	*	*	*	*
Standards information		*	*	*
INFORMATION ANALYSIS & CONSOLIDATION				
Research abstracts		*	*	
Digest for managers	*		*	
Technical digest	*	*	*	
Digest for technicians				*
Numerical data service		*	*	
Statistical digest	*		*	
Management information service	*		*	
Products/Process/innovation info.		*	*	*
SPECIALIZED SERVICES				
Market research/intelligence	*		*	
Forecast/Trend reports	*	*	*	
Company profiles	*		*	
Contracts and tender notices	*		*	
Environmental scanning	*	*	*	
Technology transfer information	*	*	*	
Expert systems	*	*	*	
COMMON SERVICES				
Library service				
Document delivery				
Document reproduction				
Translation				
Editorial/Technical writing				
Publication services				
Organization of seminars/exhibits				

TM = Top Management; R&D = Research and Development Groups MM = Middle Managers; TECH = Technicians/Operators

Annex 1 SAMPLE OF

QUESTIONNAIRE ON SURVEY OF SSA & NRCR
INDIVIDUAL USER

1. Name: . . . . . .
2. Position: . . . . . .
3. Name of Institution . . . . . .
4. Address :
   Postal: . . . . . .
   Phone: . . . . . .
5. Field of Specialization:
   . . . . . .
   . . . . . .
   . . . . . .
   . . . . . .
6. Nature of Work:
   . . . . Research . . . . Consultancy
   . . . . Teaching/Academic . . . . Extension Services
   . . . . Commercial . . . . Student
   . . . . Information Service . . . . Others, (pls specify)
7. Nature of your collaboration with NDC, if any
   . . . . . .
   . . . . . .
   . . . . . .
8. How did you come to know about NDC publications
   . . . saw it in NDC library
   . . . saw it in your institution'library
   . . . saw it in anothor library
   . . . cited in another document
   . . . colleagues
   . . . sent by NDC
   . . . others (pls. specify) . . . . . .

9. How do you get NDC Publications
   . . . free
   . . . Purchase
   . . . on exchange for . . . . . (title of publication)

10.a. Which of the following NDC publications do you use and how often:

	Frequently	Occasionally	Not at all	Have not seen it yet
SSA	. . .	. . . .	. . . .	. . . .
NRCR	. . .	. . . .	. . . .	. . . .

10.b. If you have not seen one or both publications because one of following reasons:

. . . Goes to Director and remains in his office
. . . Goes to library but is not displayed in a visible place
. . . I do not look for it in library
. . . I do not go to library
. . . other (pls. specify)
. . . . . .
. . . . . .

11. For what purpose do you use

the Sudan Science Abstracts

. . . For supplementing other sources of information
. . . for providing background information/review of literature
. . . For keep up to date on recent research
. . . To identify other researchers and institutions active in the subject
. . . others (pls. specify) . . . . . .

and National Register of Current Research

. . . For supplementing other sources of information
. . . for providing background information/review of literature
. . . For keep up to date on recent research
. . . To identify other researchers and institutions active in the subject
. . . To identify funding agencies supporting research
. . . others (pls. specify) . . . . . .

12. NDC is in the process of developing services; below are a list of some of them. Please rank them in order of priority:

	very low	low	medi-um	high	very high
a. supplying photocopies of articles					
b. supplying photocopies of mirocfiche					
c. SDI services					
d. Providing literature searches					
e. Providing bibliographies on specialized subjects					
f. Providing paper copies of mircofiche					
g. others (pls. specify)					

13. Please give your opinion about the following NDC publications:

Sudan Science Abstracts

	VERY LOW	LOW	MEDI UM	HIGH	VERY HIGH
a. Quality of abstracts					
b. Helpfulness of the arrangement of entries					
c. Adequacy of indexing					
d. Adequacy of data elements (author, title,etc...)					
e. Quality of presentation of publication					
f. Quality of printing					
g. other (pls. specify)					

National Register of Current Research

	VERY LOW	LOW	MEDI UM	HIGH	VERY HIGH
a. Quality of abstracts					
b. Helpfulness of the arrangement of entries					
c. Adequacy of indexing					
d. Adequacy of data elements (author, title,etc...)					
e. Quality of presentation of publication					
f. Quality of printing					
g. other (pls. specify)					

14. Please list of publication which in your opinion cover research work in your specialization specially relating to Sudan

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

15. Please give your suggestions/recommmendations on how NDC can improve the services:

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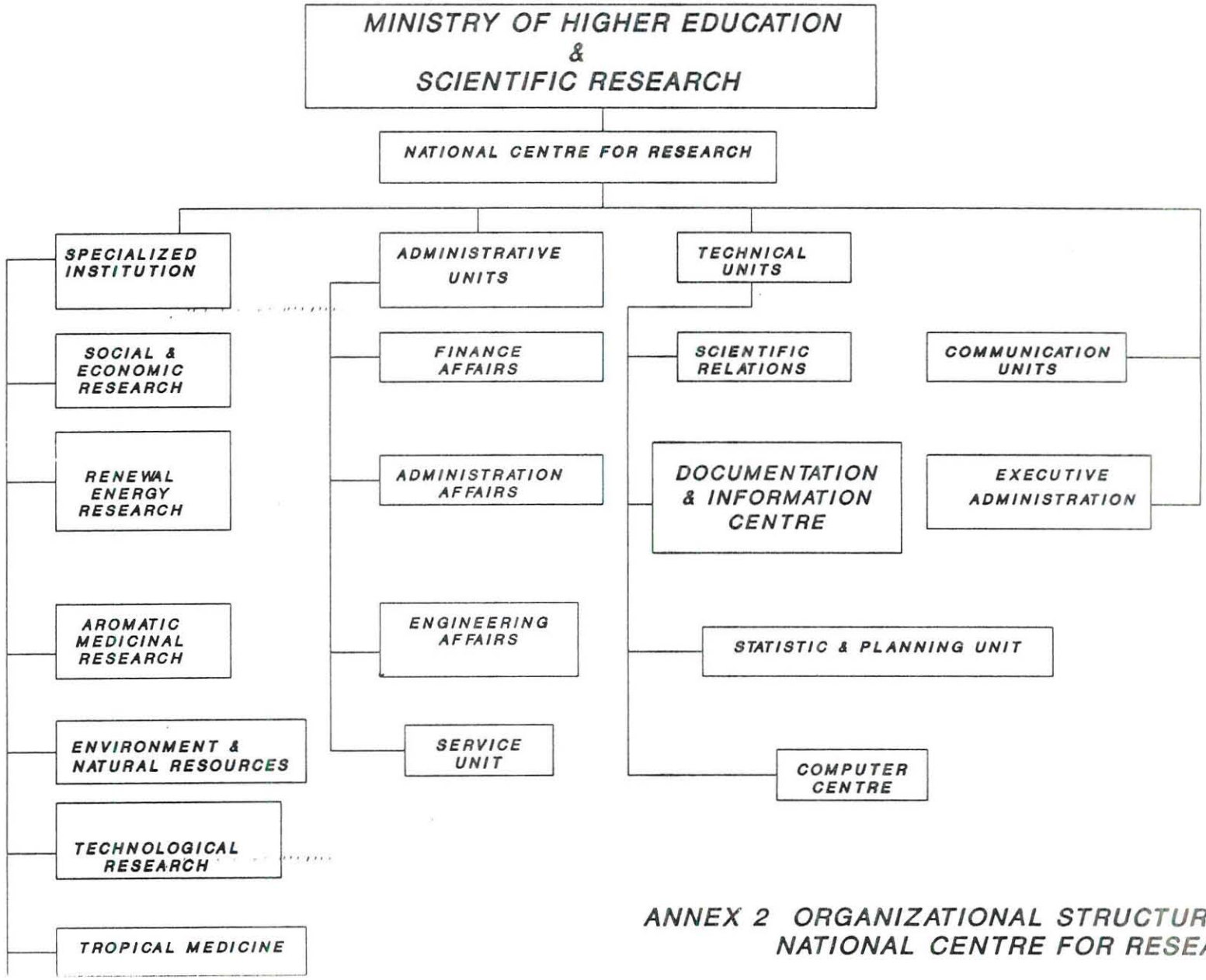
. . . . . .



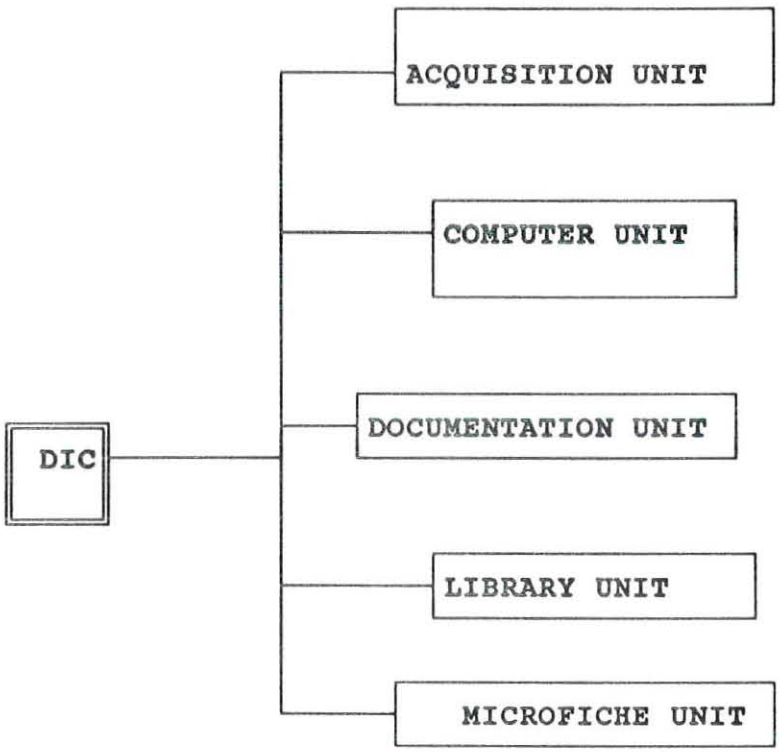
ANNEX 2 ORGANIZATIONAL STRUCTURE OF NATIONAL CENTRE FOR RESEARCH

ANNEX 3

ORGANIZATIONAL STRUCTURE

OF

DOUCMETATION AND INFORMATION CENTRE

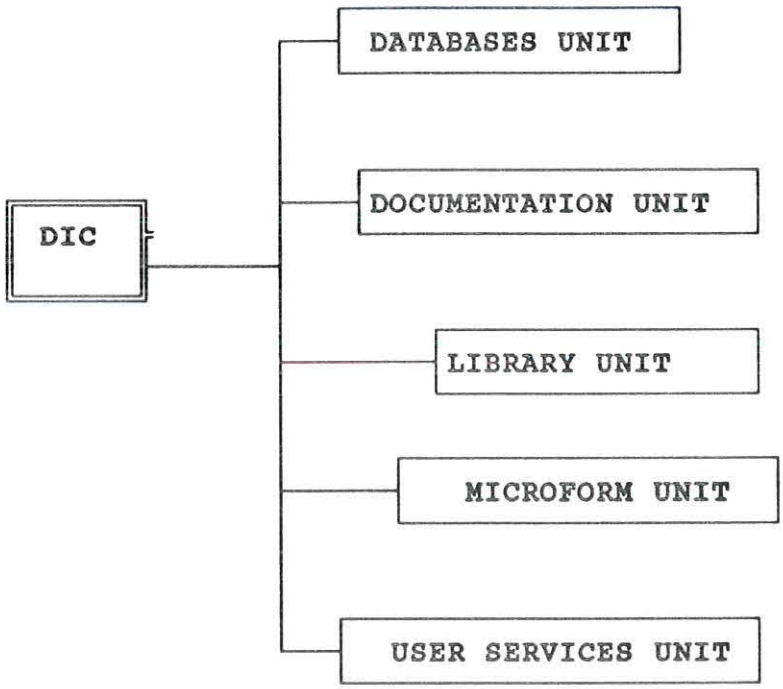


ANNEX 4

PROPOSED ORGANIZATIONAL STRUCTURE

OF

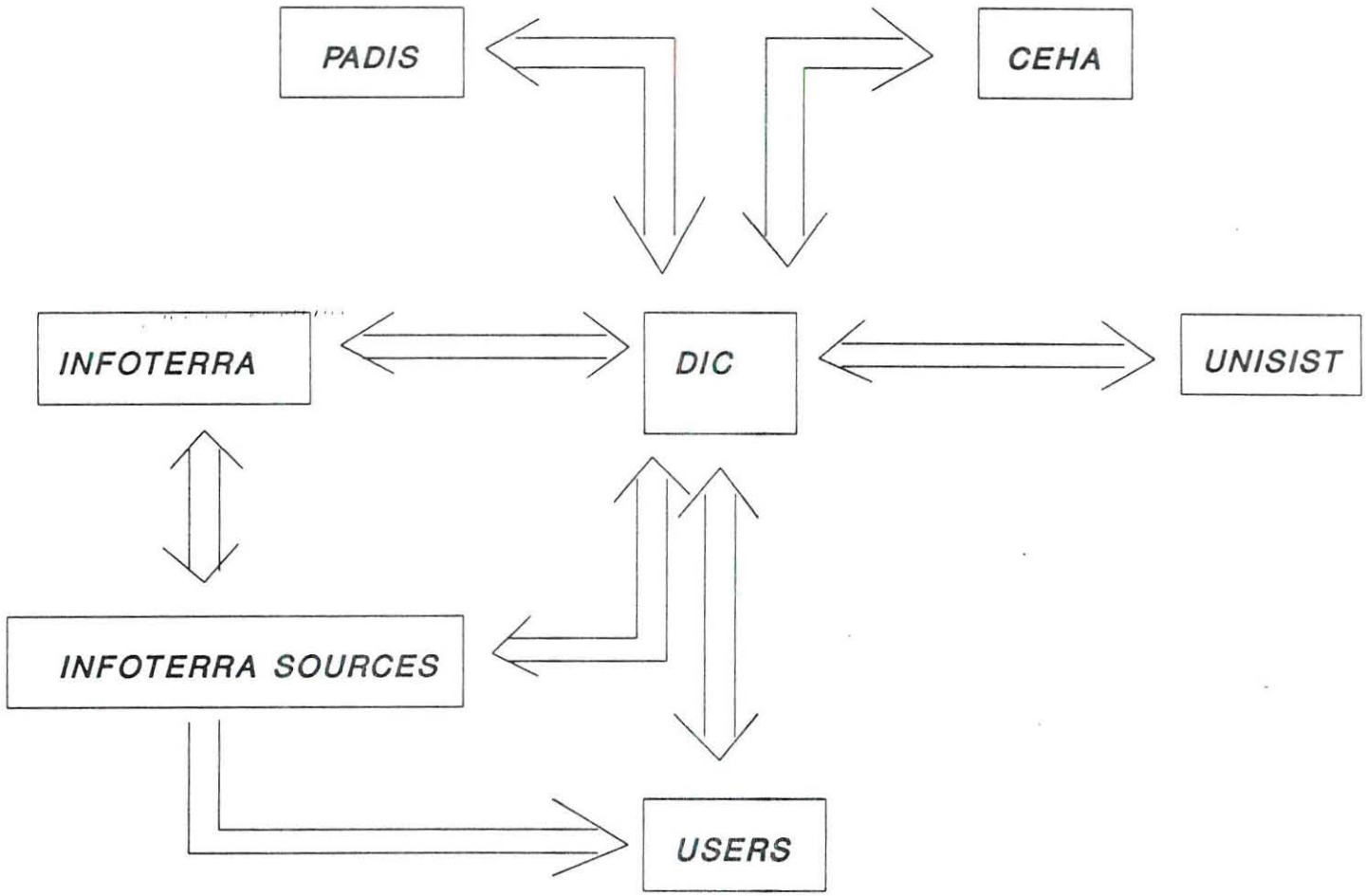
DOUCMETATION AND INFORMATION CENTRE



[Suggested by DIC director in February 1992]

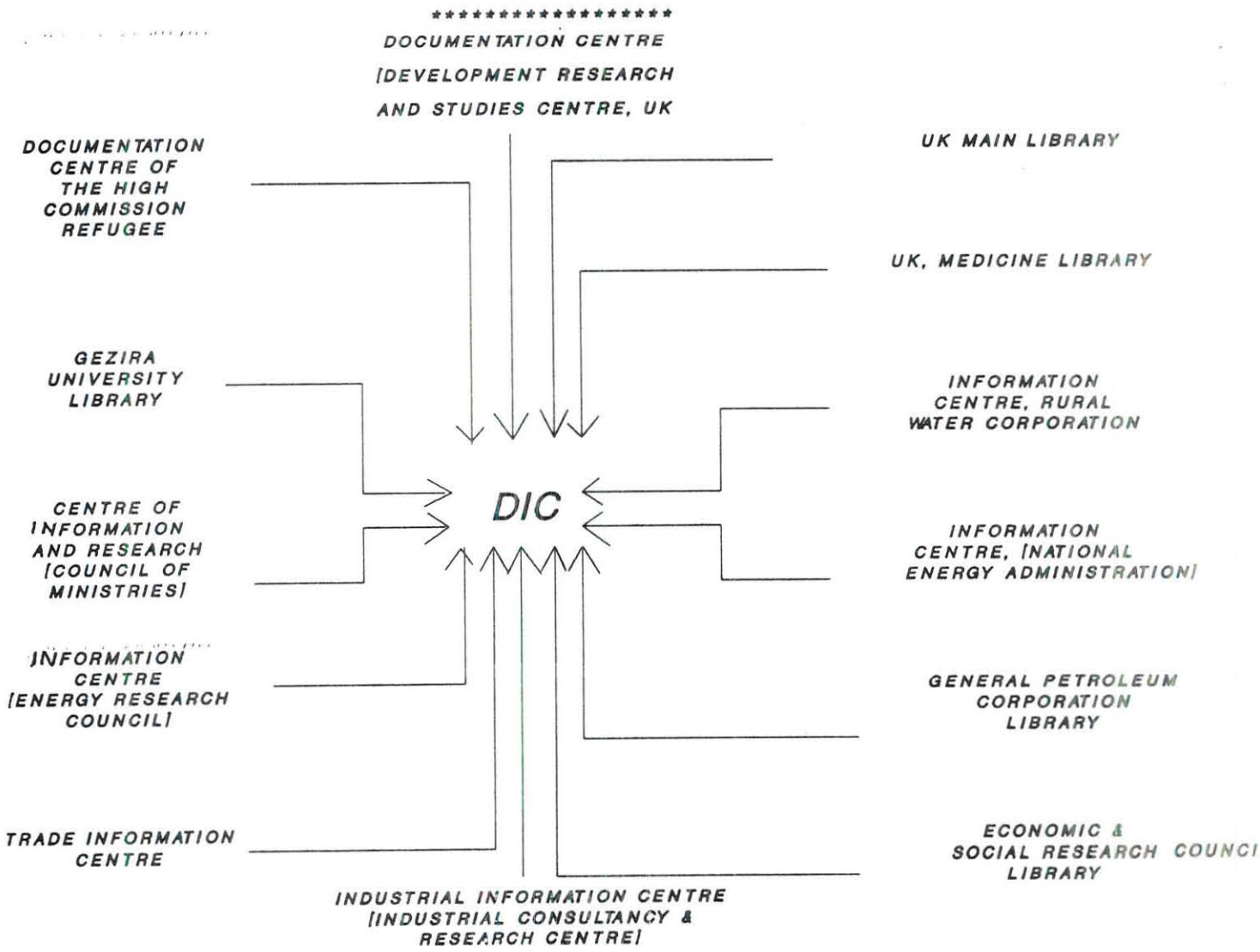
ANNEX 5

DIC
NATIONAL FOCAL POINT FOR
INTERNATIONAL/REGIONAL NETWORKS



ANNEX 6

DIC NATIONAL NETWORK



UK, stands for university of Khartoum

ANNEX 7

SAMPLE OF SUDAN SCIENCE ABSTRACTS'S ENTRY

SUDAN SCIENCE ABSTRACTS

631.55 (624.31) Harvesting; North Darfur

0251 Results of North Darfur pre-harvest survey: October 1988 [MICROFICHE] / Mohamed, Mohamed Ibrahim; Buchanan-Smith, Margie, Agricultural Planning Unit, Ministry of Agriculture and Natural Resources, Darfur Region.

El-Fasher : APU Nov. 1988. 36 p. : maps, tables

Project: Darfur Regional Government Technical Cooperation Project.

Describes the results of a pre-harvest survey which was carried out during the first three weeks of October in order to make an early and systematic assessment of the expected grain harvest and food security situation into 1988/89. The survey was based on a key informant methodology. (5 refs.).

631.55 (624.3) Harvesting; Darfur

0252 Pre - harvest survey 1987 [MICROFICHE] / Western Savannah Development Corporation, Monitoring and Evaluation Division, Nyala, SD.
Nyala : WSDC Feb. 1987. 22 p. : tables

The objectives of this survey were to provide a preliminary estimate of the production of millet, sorghum and groundnuts in the WSDC area during the 1987 cropping season; to identify areas of surplus and deficit food grain production; and to consider whether areas of deficit will be supplied as a result of market forces or whether action by Government will be required to prevent hardship among some sections of the population.

ANNEX 8

SAMPLE OF SUDAN SCIENCE ABSTRACTS'S AUTHOR INDEX

SSA: AUTHOR INDEX - NAMES OF PERSONS

ANNEX 9

SAMPLE OF SUDAN SCIENCE ABSTRACTS'S AUTHOR INDEX

SSA: AUTHOR INDEX - NAMES OF CORPORATE BODIES AND CONFERENCES

ANNEX 10

SAMPLE OF SUDAN SCIENCE ABSTRACTS'S SUBJECT INDEX

SSA: SUBJECT INDEX

ANNEX 11

SAMPLE OF SUDAN SCIENCE ABSTRACTS'S GEOGRAPHIC INDEX

SSA: GEOGRAPHIC INDEX

ANNEX 12

SAMPLE OF NATIONAL REGISTER OF CURRENT RESEAERCH'S ENTRY

07 NEWSPAPERS. JOURNALISM

SER. NO. : 0001

TITLE : Coverage of government opinion and opposing opinion in two Sudanese newspapers before and after the nationalization of the press, 1968 - 1983.
THESIS : Thesis, Ph.D. Ohio University. 1985.
PRIN.RES.: Hussein, Bashir Salih.

2 RELIGION

SER. NO. : 0002

TITLE : The encounter of religion : an analysis of the problem of religion in Southern Sudan, 1899-1983.
THESIS : Thesis, Ph.D. Temple University. 1986.
PRIN.RES.: Kurdi, Mahgoub Ahmed.

297 ISLAM

SER. NO. : 0003

TITLE : The religious, social and cultural history of the Majadhib.
DESCRIPT.: Taking the example of the majadhib a religious family whose various branches gained influence in northern and eastern Sudan since about 1700, this study seeks to elucidate the dialectic relationship between the given facts of a society (be they present institutions or past events) and their interpretation, appropriation and enactment by its members. Thereby, it is hoped to clarify the process by which identity is shaped and world view constituted as real and normative.
PRIN.RES.: Hofheinz, Albrecht.
RES CENT.: Institute fur Islamwissenschaft. Freie Universitat Berlin.
National Records Office.

FUNDS : German Academic Exchange Service

DURATION : 1986-12 to 1990

ANNEX 13

SAMPLE OF NATIONAL REGISTER OF CURRENT RESEAERCH'S INDEX OF RESEARCHERS

ANNEX 14

SAMPLE OF NATIONAL REGISTER OF CURRENT RESEAERCH'S FUNDING ORGANIZATION INDEX

FUNDING ORGANIZATIONS INDEX

ANNEX 15

SAMPLE OF NATIONAL REGISTER OF CURRENT RESEAERCH'S SUBJECT INDEX

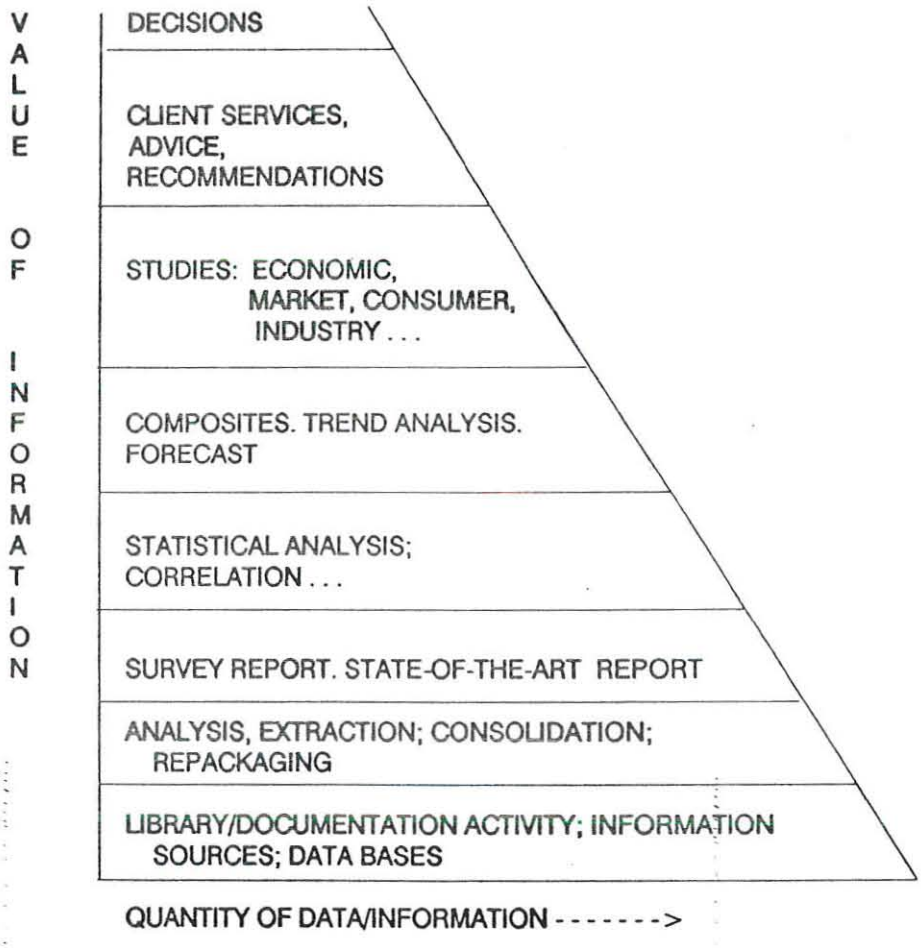
ANNEX 16

SAMPLE OF NATIONAL REGISTER OF CURRENT RESEAERCH'S RESEARCH ORGANIZATION INDEX

RESEARCHERS' INDEX

ANNEX 17

INFORMATION HIERARCHY IN DECISION SUPPORT SYSTEM



ANNEX 18

LISTS OF INFORMATION SPECIALISTS AND USERS

Saddik Solbi
PADIS,
Economic Commission for Africa
Addis Ababa
****
Dr. Cecil Wesley
Documentation and Information
Centre,
National Centre for Research
Khartoum
*****
Prof Abdel Rahman El Nasri
Centre of Archives, Library
and Information Centre
University of Khartoum
****
Gamal Fayek Andrawas
Arab Centre for Agricultural
Documentation Centre
AOAD, Khartoum
*****
Dr. El Hag Ahmed El Hag
National Industrial
Information Centre, Khartoum
****
Dr. Abu Bakr El-Siddig Osman
Librarian
University of Khartoum
Khartoum
****
Prof. Farouk Ahmed Salih
Shambat Research Station
Khartoum North
*****
Prof Faiz Faris Bebawi
Faculty of Agriculture
University of Khartoum
***
Ismail Adam M Zein
National Remote Sensing Centre
National Centre for Research
Khartoum
****
Dr. Ibrahim Ahmed Abdel Aziz
Dental School
University of Khartoum