

INFORMATION MANAGEMENT AND SERVICE UTILISATION
OF RAW MATERIALS INFORMATION SYSTEM (RMIS): A
SURVEY OF SELECTED RESEARCH INSTITUTES IN NIGERIA

By

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ZARIA

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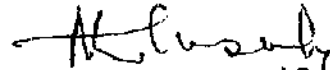
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DECLARATION

I hereby declare that this thesis has been written by me and that it is a record of my own research work. It has not been presented in any previous application for a higher degree. All quotations and sources of information are specifically acknowledged by means of references.


Abu Yusuf 12/8/04

CERTIFICATION

This thesis titled: "Information Management And Service Utilisation Of Raw Materials Information System (RMIS): A Survey of Selected Research Institutes in Nigeria", by Abu Yusufu meets the regulation governing the award of the degree of Master of Library and Information Science of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.



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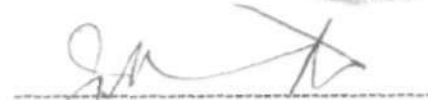
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DEDICATION

"Bismilahir-Rahamanir-Rahim. All Praises and Thanks belong to Allah, the Most Beneficent, the Most Merciful". May the Peace and Blessing of Allah be Upon Our Prophet Muhammad (SAW). Ameen.

This work is dedicated to my late grand mother Alhajiya Hadiza Mohammad fondly called 'Iye', my late mother Alhajiya Maryam Adama foundly called 'Yawo' by us and Alhajiya Maimuna (Oja Metuwo)—all of whom have seen to our up-bringing and early education. May Allah rewards them with *Aljanna Firdausi, Ameen*

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ABSTRACT

The Raw Materials Information System (RMIS) was initiated to tie together raw materials and industrial data for the purpose of information dissemination to nation's industrial sector. This effort undertaken by the Raw Materials Research and Development Council (RMRDC), Abuja consisted of a computerized information system and an automated library system.

This study investigates the information management and service utilisation of the Raw Materials Information System (RMIS), Abuja in selected research institutes. To achieve this objective, six research questions were raised. The research method adopted for the study was the survey method. The questionnaire including the unstructured interview and observations of the real-time operations of the information system were used as instruments to collect data.

The finding confirms that the Raw Material Information System has the potential to promote research and development activities. It was well structured on an administrative and technical platform to achieve the goals and objectives put before it. The information dissemination activities are delivered at two levels. On the one level is the overwhelming involvement of information communication technology (ICT) structure; and on the second level is the information dissemination profile of the RMRDC Library, which is fully automated.

Information generation activities of the RMIS is provided by special 'multi-disciplinary task force committees'. These committees provide data from the field and liaison activities. These data are then tied together into information and fed into databank.

A Local Area Network (LAN) provides the essential backbone for the transmission and exchange of information within the Raw Material Research and Development Council (RMRDC), Abuja, as a whole. Ninety-eight computers were online at the LAN level. Very Small Aperture Terminal (VSAT) communication technology was mounted to provide linkage with other research institutes across the country. The library sub-system provides further boost for the efficacy of the RMIS.

It could also be proven that an extensive computer linkage within an environment improves information flow. It also provides instantaneous feedback for the purpose of correcting and improving information dissemination activity. Therefore, a networked information system augments the capabilities of the organization to disseminate information qualitatively and quantitatively.

It has also been realized in the course of this study that though the investment in information technology by the RMIS is enormous, however, the dividends in the area of research and development activities far outstripped its costs. It is therefore recommended that ICT standards in all research institutes under the Federal Ministry of Science and Technology be raised to promote information dissemination activities.

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Abbreviation

ARCT	African Regional Centre for Technology
ARCTIS	African Regional Centre for Information Technology System
ATBU	Abubakar Tafawa Balewa University
CDS_ISIS	Computerised Documentation System--Integrated Set of Information System. (A Library Management Automation System)
CGIAR	Consultative Group on International Agricultural Research
CODATA	Committee on Data for Science and Technology
EINECS	European Inventory of Existing Chemical Substances
FUT	Federal University of Technology
ICT	Information Communication Technology
ICSU	In
	ternational Council of Scientific Union
IDRC	International Development Research Centre
IITA	International Institute for Tropical Research, Ibadan.
IT	Information Technology
MIS	Management Information System
NADICEST	National Documentation and Information Centre for Science and Technology
NBTE	National Board for Technical Education
NCRI	National Cereals Research Institute, Badeggi
NIIA	Nigerian Institute of International Affairs
NUC	National University Commission
NUMIS	National University Management Information System
Telenet	National Technical Information Services Networks (USA)
TINLIB	The Information Navigator of Libraries (Tertiary Institutions)
VSAT	Very Small Aperture Terminal.
X-LIB	Library Automation programmed developed by RMRDC Abuja.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the study

What is information? Such a question would appear to be pedagogic. Answers could be far-fetched and idealistic. However Anatol Rapaport (1953:1) proffered “a notion” of information. He provided an analogy as to what constitutes “information”: (i) information should have value, that is, one should be prepared to pay for the information he requires; and (ii) information should add to existing knowledge. He concluded by pointing out that the propelling force in the dissemination of information is “man’s communication process”. It is no wonder that by the middle of the last century, “our preoccupation with communication is due largely to the extraordinary development in communication technology”.

Information has value. Today, information has come to be recognized and accepted as vital resources equitable to any national resources. Wali, (1992:4). It is a necessary tool for planning, policy formation and decision-making in all spheres of national development.

Drawing from the analogy of the two scholars above, one could identify information as facts or knowledge put together to promote human resourcefulness—socially, economically, scientifically and technologically. Proper information therefore promotes the resourcefulness of a person, an organisation or the nation at large. The importance of information to national development cannot, therefore be overemphasized. However, relevant information must be collected, selected, organized and disseminated for the purpose of achieving particular goals and objectives. The acquisition, processing

and dissemination of proper information will require an investment in information infrastructures and facilities.

The growth of information has been described as exponential. Lynch, (1974:1), Lancaster (1978), Wali, (1992:4). This view is supported from the existing scenarios of information generating activities. For example, Nigeria has numerous educational institutions at the tertiary levels, a number of research institutes, non-governmental organisations (NGOs), the industrial sector, commerce and government parasatataals. All these institutions produce, store, retrieve and disseminate information to enhance and execute their numerous responsibilities.

One notable area where information-generating activity is paramount is in the area of science and technology. Lynch, (1974), Ash, et al, (1985), Aribisala, (1988). As a result, the provision of scientific and technical information, as one of the many raw materials being input, is itself coming under scrutiny.

Lynch, (1974), Nzotta, (1985), Adimorah (1993:21), all agree that it is essential to understand the level of the effectiveness of information in stimulating and creating research and development (R & D) activities. In other words, since making available accurate and current information supports and stimulates research activities and innovation, it is necessary to compare, contrast and evaluate information channels of communication or "modes of access to information" from time to time.

According to Mowshowitz, (1976:189), Ein-Dor and Segev, (1978:1), information processing is one of the most pervasive, fundamental and common of human activities. It involves costs and choices common with most economic activities.

Stressing further, Alegbeleye and Nzotta, (1992:55) stated that organisations use information in two major ways: in their day-to-day or current operations as well as in supporting management decision-making. Today there are attempts to harness and

integrate information systems and services. These activities are common in our libraries and other information agencies or information centers.

This brings to the fore the relevance of information resources management and the information management systems (MIS). Because of the increasing volume of information and its globalisation, the use of computer-based information system is increasingly having a stronghold in the art of information management. According to Vossen, (1992:133), the improvement of application software such as the data base management system (DBMS) and increased processing power of the personal computers (PCs) has provided an enabling environment for an effective method of organisation, creation, manipulation and maintenance of large collection of information.

O'Brien, (1996:234) posits that computer-based information system covers a very broad range of activities. The data base system provides the "fixed formats record based data models" providing the enabling atmosphere for effective information storage and retrieval. The data base management system is the foundation of modern methods of managing data. Bray and Freeman (1979:3) had earlier stated that computer-based information systems were sufficiently designed to cater for the ease of record input and record manipulation. Through series of programmed language, queries or permutation can be logically introduced to retrieve particular and accurate information from a cluster of information in the DBMS.

According to Hartley (1975:p.1-11) the database will contain the necessary information for the day-to-day operation of the business enterprise and will serve as an extremely valuable tool for planning and decision.

Explaining further, Kameron, (1978:15), said that while the DBMS provides the enabling physical environment for information resource management, the management information system (MIS) represents a functional concept of articulating the needs for

distribution and utilisation of stored information. The MIS thus, "is an organized method of providing past, present and projection information relating to internal operations and external intelligence. It supports the planning, control and operational functions of an organisation by furnishing information in the proper time frame to assist the decision maker".

A necessary characteristic of an MIS is like any information system in general. It is to collect, store, process and output information. In fact, many MIS are based on operational systems and resolve from them. As it is today, MIS is synonymous with the extensive use of electronic computers and DBMS application programmes.

Raw Materials Development Research Council (RMRDC) Abuja.

In 1987, the federal government of Nigeria promulgated the Decree No. 39 which established the Raw Material Research and Development Council (RMRDC). Amongst other functions stipulated, the Council was given the primary role to "draw up policy guidelines and actions programmes on raw materials acquisition, exploitation and development". As a result, the Council was from the beginning deeply involved with the responsibility of identifying and documenting locally available sources of raw materials so as to persuade the industrial sector to shift their emphasis from the importation of raw materials to the utilization of the locally available raw materials as local input. (RMRDC: 1999, p.18-29)

In pursuing its objectives, The RMRDC realized that the lack of technical information on the locally available raw materials in the country was a great hindrance to meeting its primary objective. It also took a decision to connect the research and development (R & D) activities of the various industrial, research and educational institutions going on in the country in order to promote cooperation and coordination of these research activities for national industrialization purpose. Thus a documentation

programme was envisaged which involves the establishment of a computer-based information system.

Raw Materials Information System (RMIS):

The Council in 1989 established a databank called the *Raw Materials Information System (RMIS)* with a mandate to process, store and disseminate information from the data to be collected and collated by the Council. The main objective of the RMIS is to acquire, process, store and disseminate technical information in support of most favorable exploitation of the nations abundant raw materials as local inputs. The RMIS was designed to serve the needs of researchers, industrialists, prospective investors, technocrats and the general public. Within this arrangement a local area network (LAN) to harness information activities within and an wide area network (WAN) to disseminate to a wider clientele was incorporated. The LAN is designated as the RMRDC-NET. It consists of over 90 nodal points using the Ethernet cable to link all the computing resources within the Councils headquarters. The WAN system is supported with an E-mail system to facilitate linkages with the office of the Minister of Science and Technology in Abuja and other research institutes under the supervision of the Federal Minister of Science and Technology (FMST). It is thus envisaged that a central repository of information or databank for industrialists and research and development activities can be sustainable.

As a database the RMIS has integrated profiles of databases to capture information from various research organisations and industries in the country. The database addresses such critical information as: (i) profiles of scientists in research institutes; (ii) profile of research and development activities in research institutes; (iii) profiles of scientific equipment in research institutes; (iv) book (stocks in research institutes libraries); and, (v) profiles of patents and inventions.

The following modules would also capture data on the following theme, amongst others: (i) national resources; (ii) resources in specific states; (iii) location of specific raw materials; (iv) investment profiles; (v) manpower; R & D activities; (vi) RMRDC liaison offices; (vi) prices of raw materials and products; (vii) process equipment manufacturers; and (viii) project funding bodies.

The RMRDC Library Sub-System

The library, which is a major unit of the information and documentation project of the Council, provides library services to cater for the information needs of the staff and researchers in the institute, prospective investors, industrialists and other interested groups in the area of raw materials exploitation as well as in the area of research and development activities. The library has continued to build-up appreciable holdings of monographs, serials and media resources. (RMRDC: Annual report, 1998, p.18). Full library automation including acquisition module, cataloguing module, circulation module and enquires/report generation modules is being effected. A software programme known as the *X-Lib* was especially designed by RMRDC to facilitate the automation of the library. The library houses about 15 PCs, a number of printers and scanning machines. Other computer accessories included digital cameras and CD-writers. Ultimately, the library resources is being intended to be on-line and accessible to all research institutes within the umbrella of the Federal Ministry of Science and Technology.

1.2 Statement of the problem

The research process had been altered in the last half a decade or more due to the widespread involvement of information communication technologies in the profile of information activities. Libraries and information managers are constantly challenged to understand these trends of events. Therefore, Farah (1995:127) opined that the urge to

explore these areas are often in order to render effective services to users or information seekers. The greatest concern to librarians and information managers of similar background is that the ICT has added a new dimension to information activities especially in the area of resource management.

In our present stage of technological transition, information is, according to Jones (2004), distributed across a range of media and formats. There is a clear trend of migration to electronic forms for reasons of distribution, manipulation, quantity, economics and convenience... By far the most difficult task on the horizon may be developing among educators and information managers a conceptual, critical, self-conscious understanding of information provided through electronic technology. These scenarios introduces serious information management problems. One of such problem is the means to obtaining the right information in the needed amounts at the correct time. No doubt, the move to electronic information formats will change the processes and methods for conducting information seeking activities. Timeliness is more important than ever. The focus will be on easy access to information.

For example RMIS has been established since 1987 with the noble objective of facilitating information dissemination. Since its establishment, it is not clear whether or not it is achieving the aims and objectives for which is has been set up. From the literature surveyed by this researcher, it shows that no earlier study has been conducted with the aim of either demonstrating the information management and working of the RMIS or to study the various forms in which the RMIS collect, process and disseminates information, as well as study the information services offered by RMIS.

It is in the light of the above that this study set out to survey or studies how effective RMIS is organized, managed and operated. Since the RMIS has been created to mainly provide various information services, the study will probe into how information

is acquired, processed and disseminated. It is also necessary to ascertain the efficacies of these services on the users.

1.3 Research Questions

- i. How is RMIS organized and managed?
- ii. How does RMIS acquire, process and disseminate information?
- iii. What type of services do RMIS provide to the users?
- iv. How accessible are the services provided by RMIS to the users?
- v. How useful and satisfactory are the services provided by RMIS to the users?
- vi. What are the problems confronting the RMIS in its implementation programme?

1.4 Objectives of the Study

This study is therefore concerned with guiding information seekers to the value and content of information available in the raw material information system in particular. In the process the databases contained in the raw material information system would be adequately described. However it is imperative that critical studies of the utilization of these services is undertaken to throw more light on these endeavours. It is in this connection that the exposition of the activities of the RMIS is being embarked upon.

As an earlier study with this particular theme has not been conducted, apart from, perhaps official publications explaining the RMRDC-NET and the NSTDB, on this onerous effort of RMRDC, this study is therefore considered timely. The study will therefore focus on describing the implementation and service utilisation of the RMIS with a view to ascertaining its effectiveness in the area of dissemination of information.

In summary therefore, the objectives of this study are:

- i) To find out how RMIS is organized and managed.

- ii) To find out how various relevant information are acquired, processed and disseminated;
- iii) To appreciate the services that is provided by RMIS.
- iv) To know how accessible the information provided by the RMIS is to the users.
- v) To determine the user interface of the database, i.e. ease of use.

1.5 Significance of the study

This study will be significant by documenting the progress thus far achieved by the RMRDC computer project. It will also stimulate the use of RMIS by exposing its activities to potential clientele within the country and outside. It is also significant as an academic effort at appraising the project in order to highlight on its shortcomings if any and to report on the progress thus far achieved.

1.6 Scope of the study

The study covered the activities of the RMIS in its efforts to acquire, process and disseminate information. The study also covered four research institutes, which are benefiting from the services rendered during the first phase of RMIS implementation programme.

1.7 Limitation of study

Due to the constraints of time and fund, the study is limited to four research institutes spread within Abuja, Kaduna and Zaria. The questionnaire was administered between November and December 2002.

1.8 Operational Definition of Terms

Control:	Involves monitoring and evaluating feedback to determine directional bearing of the information dissemination services.
Databank:	Computer-based information resourcefulness of an organisation.
Database:	Records contained in a computer-based management information system.
End-User:	Persons who use an information system or the information disseminated by the MIS setup.
Feedback:	Data about the performance of a system.
Information Management:	The effort of an organisation to streamline its information generating and disseminating activities for effective results. It involves, planning, collecting, organizing, use, disuse and control of information flow.
Information proliferation:	An expression often used by information managers/librarians in expressing the exponential growth of information
Information System:	Combination of persons, hardware, software and telecommunication networks used in processing and dissemination of information of an organisation.
Input:	Involves capturing and assembling data that enter the information system.
Network:	Connectivity of two or more computers through the necessary information communication technology to enhance information dissemination.
Online:	Access to information within a networked environment.
Output:	Element of information dissemination.
Processing:	Transforming data into ready information.
Service Utilisation:	The activities of the users of information in respect of their individual information profiles.
System:	a group of interrelated components working together towards a common goal of information processing and

dissemination.

Web site:

an Internet environment exclusively devoted to an organisation and its information dissemination activities.

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CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter reviews literatures that are related to the study. This was discussed under the following headings:

- 2.1. Information management.
- 2.2. Databanks/databases, structure, types and uses.
- 2.3 Management Information System (MIS), structure and uses.
- 2.4 Network: type, structure and uses.
- 2.5 The place of MIS in research and academic/tertiary institutions.
- 2.6 Raw Materials Information System.
- 2.7 Summary of the Reviews.

2.1 Information Management

Alegbeleye and Nzotta (1992:59) both agreed that the terms “information management” and “information resource management” have similar connotation. They proffer further that “management information system” (MIS) represents a narrower term under this new concept. Their definition of information management adapted from Sangway’s says information management is:

“the means through which organisations maximize the efficiency with which it plans, collects, organises, uses, controls, disseminates and disposes of its information and through which it ensures that the value and potential value of that information is identified are exploited to the fullest extent.”

This definition provides a pragmatic approach to issues of information management.

Lucas, in: Ligon, (1978:23) has noted that information must be managed if it is to be useful beyond the moment of observation to individuals and groups. In his explanation he enumerated four levels of information management. These are: (i). Classification of data: this provides identification of groups and related classes. (ii) Establishment of procedure for recording data in a manner facilitating recall yet sufficiently simplified to enable the operation to be routinised. (iii). Summarization of data classified and recorded. (iv). Specification of the collection procedure of the system. Thus, information management has gradually evolved to contend with the advent of computers in the preservation, retrieval and dissemination of information. According to Ligon (1978:5-13) changes were becoming evident in information collection and dissemination with the advent of computers.

Wali, (1992:4) noted that a large number of people, organisations, and agencies are today involved with generating a lot of information. As a result information resources is being produced in a variety of formats. Consequently, he asserted that effective planning and coordination of information management cannot but recognize the relevance of information technology. Establishing an effective information services, therefore, requires "creating the infrastructures, identifying and integrating a wide range of information handling activities and technology". Sandra Kerka (1997:1) believes as well as Shenk (1997) does, that presently "the human capacity for producing information is far greater than the capacity to process it". According to these scholars, terms such as "Information Overload", "Info-glut", "Infobog" and "Data Smog" have being in use in order to express the deep concerns of information managers to tackle the obnoxious situation of excessive information flow. Indeed, according to Kerka (1997:1) as information proliferates so do the labels for this malaise of the "Information Age."

Alesandrini (1992) had earlier confirmed that the technological means of distributing and accessing information has become imperative and plays a strong part as the facilitator. As a result he pointed out that most traditional information management practices are too limited and sometimes narrower in scope to be able to tackle the new dimension added to information management. He idiomatically stated that these traditional practices were like "pipes developed for a stream, not an ocean". Tetzeli, (1994:60) expressing some concern, in the face growing problem of information resource management in view of the exponential growth of information, had alluded to the fact that "information infrastructure is a constant part of our lives as religion was for medieval surfs". In fact, Milton, (1989:6) had since observed, that "almost all our resources are dedicated to gathering the raw material—information—and almost nothing is spent on the most important job of transforming information into intelligence". Koniger and Janowitz (1995:6) further asserted that "information is valuable only to the extent that it is structured". Information is vital to the functioning of individuals, organisations and the society at large. Allardice (1997) clearly illustrated this statement when he graphically stated that more than 82 million people worldwide readily access the web; and some 845,000 homepages provide a wide variety of information.

In his observation, therefore, Allardice (1997) suggested that for the information worker to overcome the business of providing access to information he must be prepared to cope with the changes in the "new information age", that is, coping with the challenges of information technologies. Changes in the roles and the functions of information professionals are envisaged. Electronic formats are expected to become more commonplace. Online services give immediate access to databases. Various

agencies and organisations offer fast and accurate sources for locating information online. Hence, traditional boundaries will change—formats, access methods and services. To keep up with these changes, investments in technology, resources and strategies are also required.

Central to information management is the 'record'. A record is an essential facet of information. The key element in a record is the 'data'. Wysocki and Young (1990:3-15) traced the concept of the term 'data' in information management was introduced as a result of the acceptance of the use of computers in processing information. Thus the concept of 'data' has connotations in terms such as: Automated Data Processing (ADP); Electronic Data Processing (EDP) or just, Data Processing (DP). The increased use of computers and introduction of computer application programmes into fields other than mere accounting and record keeping introduces the wider concept of 'information processing'. When computers gained wider grounds in the day-to-day information activities in almost all facets of businesses and organisations, the word 'processing' was replaced with 'system' representing a new concept of the 'information age'. Accordingly a broader term, 'information system', was adopted.

Therefore, an 'information system' (IS) must possess the attributes to facilitate the determination of user needs, to select pertinent data from the infinite variety available from an organisations environment (both internal and external), to create information by applying the appropriate tools to the data collected and to communicate the generated information to the user.

2.2 Databanks/databases: structure, types and uses.

There seems to be no clear demarcations between data bank and database. This assertion is evident in the definition of both terms as presented in the two standard dictionaries of science and technology.

McGraw-Hill (1976:372) defines a data bank as “a complete collection of information such as contained in automated files, a library, or a set of computer disks...” while Larousse (1995:283) defines it as “a collection of database or large files of data.”

Therefore, from these two definitions, a data bank can be deduced to be synonymous to a database and its attendant structures. Data banks are also referred to as non-bibliographic databases. This is because as opined by Ash, Janet et al. (1985:70) they contain both factual and numeric data. Data can serve as information on its own, it can also serve as raw information which can be manipulated to provide answers to queries directly, without the need to locate the primary sources of information.

Mowshowitz (1976:192) submitted that a data bank provides faster access to information, promotes wider distribution and free administrators from routine record keeping activities; thus it provides an effective information dissemination system. Data bank represents a greater consistency in reporting, reducing the rate of *noise* or distortion in information retrieval; providing an enormous data inventories for general use. Indeed, Milton (1989:6) explained that the understanding of the concept of data is essential to the understanding of the distinguishing qualities or relationship amongst data, information, and knowledge: “data are raw facts and figures, information is data organized into a meaningful context, and knowledge is organized data (i.e., information) that has been understood and applied.”

The need for improved information services in recent years has been made critical by the steady growth in size and complexity of many organizations Adimorah, (1993:19-26). In their assessment, Janet Ash, et. al, (1985:) posit that over the past forty years, it has been noted that the annual volume of chemical papers alone, has increased roughly five-fold, while novel experimental techniques have greatly increased the information content of these documents. If this assertion is applicable to the other disciplines of knowledge in the science and technology fields, it translates into an exponential growth of information. Abdullahi and Ajoku (1998) further confirmed that information technology (IT) has a potent role in the delivery system of information for industrial and technological development. They observed that the involvement of IT in information gathering and dissemination activities in the fields of scientific and industrial activities such as agriculture, the mining industry as well as in the areas of commerce, transportation, has continued to expand. The integration of IT in the information activities in these sectors will steadily enhance research and development relationship and ensure a dynamic cooperation among researchers, manufacturers, commercial and the banking industries.

The need for special provision for handling scientific data has been well established. An international organization, the Committee on Data for Science and Technology (CODATA), is one such example. CODATA was established by the International Council of Scientific Union (ICSU) in 1966 to promote and encourage throughout the world the production and distribution of collection of critically selected numerical values of properties of substances of importance to science and technology.

2.2.1. Types and uses of data banks

Data banks were classified by the name of the organization from where it is originating i.e. either a private organization or a public organization. In other words, the organization providing the motivation for generating data and/or the body responsible for the legislation or policy guidelines oftentimes, determines the identity of a data bank. The legislation or policy guideline will actually determine what is to be collated into databanks. Secondly, specialists in certain discipline, on the other hand, can also provide the impetus for the collating of data and thus facilitating the creation of a databank. Janet Ash et al. (1985). Much earlier, Mowshowitz (1976) suggested a different way of classifying data banks. In his own opinion, a data bank might be classified by enumerating the purpose for which the data bank is set up and its organisational location, i.e. a descriptive approach while an analytical approach will also take into consideration the way information is shared.

The National Institute of Health (NIH) in collaboration with the Environmental Protection Agency (EPA) (both are bodies of the United States government) has created Chemical Information System (CIS) for gathering information on toxic substances. This was made possible through a government legislation or act promulgated in 1981. The NIH-EPA Chemical Information System (CIS) has been identified as a "comprehensive chemical data system".

The CIS was developed by cooperating agencies of the US government and other organisations. It is accessible through a network of the National Technical and Information Services, the "Telenet" and "Tymet" of the USA. The databank covers a wide area of chemical information. For purposes of ease of access to information that is contained in its database structures and the substructures, an indexing programme is provided and available for use along with the database. The database also includes an

analytical programme supporting statistical analysis. The central programme of the CIS is the Structure and Nomenclature Search System (SANSS). This is held in the hub and allows a search through linked databanks. Searches can be conducted by use of name, molecular formula and the "Chemical Abstracts" (CAS) registry number. Searches may also be conducted within the substructures by name, fragments, partial molecular formula and query structure. This gives the CIS a very comprehensive outlook.

In another development, a legislative support for establishing a databank was given in 1981 by the Commission of European Communities (EEC) resulting in the establishing of European Inventory of Existing Commercial Chemical Substances (EINECS). This legislative article provided the groundwork in which all new chemical substances are notified to the recognized authority for the purpose of an inventory to inform all interested groups within the European communities. This resulted into such databank as the Cambridge Structure Database (CSD). This is representative of a potent chemical data system available for research and industrial activity. The CSD is an example of a databank where information is disseminated by two main routes: via printed books and via machine-readable database. The bibliographic information is published annually in the reference book series titled: *Molecular Structures and Dimension*. On the other hand, the electronic files are available as software programmes which operate on the direct sequential files. They have a degree of compatibility that allows their being accessed by other bodies such as the NIH-EPA (CIS) in the USA and TOOL-IR in Japan. There are over twenty other affiliates in British centres worldwide who can access the programme. The CSD information content consists of three segments: bibliography; chemical connectivity and numeric data.

Following the example of foreign based data bases, Adesina (2001:i) averred that in 1988, French Institute for Research In Africa (IFRA) launched a similar project: "Nigerian Social Science Resource Database" (NSSRD). The objective of the project was to develop database of social science research institutions and resources in Nigeria. The database will be available online as well as on printed form. The NSSRD project was designed to cover research activities in the field of social science and related fields being undertaken in the Nigerian universities and special social science research institutes as well as non-governmental organisations.

The NSSRD database structure is made up of two sub-sets. The first sub-set is concerned with an institutional database providing such basic information as the names, locations, addresses, mandates of the research centers as well as its research activities. This sub-set is designated as 'Database of Institutions and Resources'.

The second sub-set is designated as *Directory of Researchers*. It provides a brief profile of individual researchers and personnel of the listed research institutions or centers. The NSSRD is available on the IFRA Web Site. It is also made available on compact disk (CD). A hard copy has also been published. Fourchard, (2001:i)

The database comprises about a total entry of 1,188 names of researchers who are involved with various facets of social sciences in sixteen disciplines. Considering the population of the researchers involved this may not be too extensive and inclusive. However the number was limited because of the responses received from the questionnaires dispatched in the cause of gathering the data. In addition to that, the list was carefully scrutinized to avoid duplication of names especially were a single researcher may be found to be an affiliate of multiple research institutes.

The institutions covered were grouped into sixteen disciplines or unit. All the units cited would have inclination in the social sciences and social science oriented activities. The disciplinary aggregation of the database of institutions is presented in the table below:

Table 2:1
Breakdown of Research Unit by Discipline

S/N	Discipline	Number	S/N	Discipline	Number
1	Agriculture	7	9	Home Economics	1
2	Archaeology	2	10	Mass Communication	4
3	Business Administration	8	11	Preventive and Social Medicine	1
4	Economics	8	12	Political Science	9
5	Education	20	13	Population and Demography	8
6	General Social Science	12	14	Psychology	3
7	Geography	13	15	Sociology	10
8	History	7	16	Statistics	1

Source: Adesina, *Jimi O. (2001:ii). *Nigerin Social Science Resource Database*, p.ii

The aggregation into the various social science disciplines also informed the presentation of the database of institutions in the order in which they are presented in the table above. The units classified as "General Social Science" represents a multidisciplinary form of activity while the other units are self evident in their collective activities. To assist in ease of searching through the database, an index of institutions, heads of units, authors and information on publications as included in the database was provided. (See NSSRD, compiled by Jimi Adesina, IFRA, Ibadan, 228p.).

In addition to the efforts at IFRA, Ibadan it is not easy to compile all the existing databases about Nigeria. Using the Yahoo/Google search machine, the researcher was able to record about 101,000 different databases linked with the subject 'Nigeria'. Produced below is an example of a web page containing this information:

Figure 1:
Yahoo Search Results for Database on Nigeria

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Yahoo! Search Results for database on Nigeria
Search Results Advanced Search
Help
Your search: database on Nigeria Categories | Web Sites | Web
Pages | News | Research Documents

http://www.uicc.org/organization/membership/directory/memb_ng.shtml
Aviation Safety Network: Nigeria accident index (M2) accident
description. Nigeria - Accident & incidents: accidents: Database
selection of all airliner hull-loss accidents in Nigeria Database
selection of ...
http://aviation-safety.net/database/country/5N.shtml
Nigeria - The 419 Coalition Website
THE FIVE RULES FOR DOING BUSINESS WITH NIGERIA. ... The Internet
database on HIV/AIDS in Nigeria, [ Join This Group! ].Home, Messages,
http://groups.yahoo.com/group/nigeria-aids/ (Search within this
site)
Ethno-Net Database: Nigeria
MOST ETHNO-NET AFRICA DATABASE. NIGERIA. http://www.ethnonet-
africa.org/data/nigeria/menu.htm Tatlici has IP 62.29 ...
http://www.soccergamer.com/database/Africa/Nigeria/ (Search within
this site)
Trade and Environment Database (TED) - Africa Cases
Trade and Environment Database (TED) - Africa Cases.
http://www.interarb.com/v1/pages/Geographic_index/Africa/ Nigeria/
(Search within this site)
Source: http://www.google.com/advanced_serch?hc=en
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The above illustration (see box above) represents efforts by foreign organisations and non-governmental organisation in enumerating database activities concerned with Nigeria in varied subject matter. However, Kerka (1997) allude to the fact that "the Internet gives the impression that the pace of change has accelerated", in the availability of information, "but what is often forgotten is that availability does not lend importance, accuracy, utility or value to the content".

2.3 MIS: structure and uses

Management information system (MIS) implies both the technique, the process, as well as the structure concerned with systematic accurate and speedy organization and control of relevant signals, data, or messages from different parts and environments of an activity unit, through appropriate collection, editing, analysis, display, storage and

retrieval of such signals or messages in manners that would be useful for managerial decision making. Nwankwo, (1985:2-3).

The concept of Management Information System (MIS) has been an evolving one. Wysocki and Young (1990:3-4) traced its origin to the expanding role of computers in business organisations. It connotes a wholistic process of information gathering and dissemination. It accepts the involvement of the computers, computer programmes, telecommunication and human endeavour in the processing of information and information dissemination. It recognizes that 'organisational system' is a pervasive and potentially dominant factor in the evolution of the concept of MIS.

In other words MIS represents the whole information resource of an organisation. This includes the systems in use, the operators and end users of such information.

Banerjee (1975:158) posits that an MIS for industries, and science and technology (S & T) involves the use of computerized information system in the industries and also in research. He further recommended that an MIS should be set up with the following broad objectives: (i) the need to build up industry and science and technology profiles and to provide for computerization of production data for industries on sectoral basis; (ii) to document all research activities, inventions and manpower available in the research institutes, universities and private outfits such as the manufacturing sectors; (iii) provide sufficient data for research and planning in respect of production targets; (iv) providing information to various segments of government on growth profiles and capacity utilisation of various industries and the progress made along the research and development levels; (v) provide data on availability of local raw material and other import substitution inputs; (vi) provide up-to-date information on

available indigenous technology, its analysis, approvals and level of foreign partnership or collaborations; (vii) disseminate information by way of giving a feedback to industrial sectors and research and development organisations periodically on production performances; shortfalls, capacity utilisation, export, foreign exchange and general information on progress made in research.

An increasing amount of information is being generated daily in different fields of human endeavour. The enormity of this level of information is such that without the development of information technology, it would be very difficult to gather, process, store and disseminate information. Within the last decade therefore, information technology has increased the ability to handle much more information than before.

Information technology (IT) is seen, therefore as a potent means for achieving industrial and overall economic growth of any nation, especially the developing nations. And, recent development world over in the field of information technology has reduced the world to a global village of information.

Siegel (1975) notes that an MIS enables people with a variety of skills to work together towards the short- and long- range benefit of the organizational system. He asserted that the core of an MIS is the data bank: the data bank as it were, provides the foundation upon which the MIS is built.

Siegel also identified two major categories of an MIS viz: (i) the user-oriented level; and (ii) the technological level. At the user-oriented level, four components were enumerated. These were (i) planning level; (ii) control level; (iii) forecasting level; and, (iv) modelling level. On the other hand the technological level is made up of the following: computing; and, data management levels.

For administrative purposes, the planning and control levels are handled by the top management of the organization; the forecasting and modeling levels are handled by management specialist; and, the computing and data management levels are handled by information specialists.

However, according to Lucas (1978:22), the success of an information system is highly dependent upon the relationship between users and the information services department. The systems equipments should be carefully handled. The organizational behaviour problems and uses must not be overlooked.

2.4 Network: type, structure and uses

Network has been defined and clearly described by so many literatures. Encyclopedia of Library and Information Science (ELIS), (1989) has however simplified these earlier definitions and further described it thus: a network contains nodes and links. A node is a point or place; it can be represented by a storage register in a computer or by a dot or small circle in a diagram. A link is the connection between a pair of nodes. In an active mode, each node is a processor; every node of a type has the same programme. A link communicates signals from node to node.

In providing a full range of information services, Mowshowitz (1976:146) noted that a computer-based information system would require three basic elements—computers, data communication facilities and terminals. Data communication facilities serve as the common message carriers for computers and users; terminals are the means by which human users interact with the network.

This networking connectivity provides the enabling facilities for users to have access to and share information resources, programmes and data located at different centres within an area of a network.

Networks are found in different structures or shapes. These are identified in several literature such as Meadow (1975); Lorin (1980). They are enumerated as: (i) star network; (ii) ring network; and, (iii) distributed network. The efficacies of these structures can further be obtained from several literature including Meadow, (1975); Lorin, (1980). Although this study is not inclined towards discussing the technicality or technological angles of network structures, it is however interested in identifying its typographies as enumerated above. Nodes are points of communication within the network system. And between any two points of a network the transmission may be *simplex, half-duplex or full duplex*. Simplex transmission is strictly not directional because one station may only send, and the other station only receives, on a simplex line. A half-duplex line permits communication between two points but one after the other in sequence. A full-duplex transmission permits simultaneous two-way communication— which Meadow (1975:241-251) demonstrated that it is akin to a telephone conversation.

In the course of information dissemination, a data management system usually has associated with it a set of miscellaneous programmes called utilities. These might include assorted programmes and memory dumps. Communications and networking facilities are the other major components of a data management system. Information utilities in respect of data banks and services thus provided reflect a particular attitude towards computer-based information /communication system. The ability to share information resources is perhaps the most powerful feature of a computer-based information system.

The MIS and their data banks, by making use of these modern communication facilities, provide access to computers and associated information files from remote

terminals. Such services amplifies the social and academic importance of a computer-based information system.

Advances in communication utilities have been made possible by message-switching technology and elaboration of remote-access time-sharing systems. Digital communications equipment for transmission of computer-usable data came into existence in the mid-1950s. Mowshowitz, (1976). And the digital communication technology has become especially important in connection with time-sharing systems. Data transmission facilities have also been improved, and new communications carriers have come into being as a response to the growing need for digital communication services.

On-line searching opens up unlimited possibilities for the utilisation of services. (Ash, et al. (1985:72). The user can now access the system using the terminal, which is connected to a modem or an acoustic coupler to a telephone line, which in turn is linked directly to a local computer, or, via a telecommunications networks, to a remote computer in another town or country.

The international packet switch services (IPSS) have been introduced to facilitate distance connectivity between computer-based information systems. These IPSS technologies have become the catalyst for cheap and effective communication over distances.

The range of operations that are carried out in an on-line search include connecting to the computer, logging on to the on-line system, selecting the file to be searched, entering and combining search terms, printing or displaying search results and logging off.

In the Nigerian environment, however Abdullahi and Ajoku (1988:57) observed that the level of facilities in terms of availability of hardware and communication systems is still lagging behind. They also observed that many institutions both in the private and public sector do not have computer-based information systems at all. One of the causes of these shortcomings has been attributed to lack of finance.

In a study conducted by Abdullahi and Ajoku,(1998:169) it was reported that the National Data Bank (NDB), a unit of the federal office of statistics, houses various types of computers. These computers were of different models and ranging from mini to personal computers (PCs). It was noted that there was an absence of a network system in place. The databases found in the NDB included those on money and banking, petroleum, manufacturing, price and price indices of commodities and products, education, health, national income and population. They concluded that the numerous database structures were perhaps created to address a multi-purpose mandate of the organisation so as to meet the needs of government for policy formation and decision-making. In addition, NDB also takes into cognizance the information needs of the productive sector of the economy.

2.5 The Place of MIS in Research and Academic/Tertiary Institutions

In their studies, Abdullahi and Ajoku, (1998) confirmed that in the area of science and technology information, there are reasonable number of research institutions in Africa, fully equipped with facilities for information gathering and dissemination. However the number of these research institutes is not fairly spread geographically, as some countries do not have more than one research institute, while others have an overwhelming presence of research institutions. The research activities in these

institutions have provided the impetus for the generation of databases and networking facilities to enhance information dissemination.

They further pointed out that accurate database and networking facilities are very lacking due to manpower needs and poor telecommunications networks. But in countries housing regional research institute, such as the International Institute for Tropical Research (IITA), Ibadan, and the African Regional Centre for Technology (ARCT), Dakar, Senegal, the use of database is developing within these regional institutions.

The IITA has generated a lot of data on plant breeding and production of diseases, resistant varieties of grains and root crops. This database is linked through a network communication system to other international centres and institutions of agriculture belonging to the network of the Consultative Group on International Agricultural Research (CGIAR). On the other hand the ARCT have established a regional information system on food and energy technology known as African Regional Centre for Information Technology Information System (ARCTIS). The system is linked up with international organisations leading to the establishment of sectoral information exchange networks in Africa. The capabilities and services of the system were further strengthened with the assistance from such international agencies like United Nations Development Project (UNDP), International Development Research Centre (IDRC) and United Nations Industrial Development Organisation (UNIDO). Since its establishment in 1982, ARCT has acquired significant number of hardware and software. These facilities are used for library management and establishment of databases; they are also being used for desktop publishing. Access to international networks and databases could be sourced online or through the databases on compact disks (CD).

In 1988, "National Documentation and Information Centre for Sciences and Technology" (NADICEST) initiated a project in which five institutions were voluntarily involved. Ike, (1992). It mandated that an 'inventory project' of science and technology information (STI) sources project be undertaken to cover five nodal centres earmarked. These were the University of Ibadan, University of Jos, Federal Institute for Industrial Research, Oshodi, Yaba College of Technology and the Abubakar Tafawa Belewa University of Technology, Bauchi (ATBU). ATBU served as the coordinating centre. The main ^htr_ust of the project was to encourage a database for bibliographical purposes.

By 1992 a NADICEST workshop was held in Bauchi. The theme of the workshop was "Access to Science and Technology Information in Nigeria". The workshop provided the platform for the design of a project that was involved with resource sharing and networking amongst science and technology institutions and organisations in Nigeria. Amongst others, NADICEST major focus was to find solutions to problem of information dissemination in the area of science and technology and also the social sciences discipline.

In pursuant of these efforts, the expansion of STI nodal centres was upgraded from five to nine. As a result, four more institutes were included. Those included were the Federal University of Technology (FUT) Owerri, FUT Minna, Nigerian Institute of International Affairs (NIIA) Lagos and the National Mathematical Centre, Abuja. Further efforts by the NADICEST has led to the establishment of a network which presently consist of 112 universities, polytechnics and research institutes in Nigeria.

The import of these efforts is to boost computerisation of information dissemination system in these institutions. However since 1992 up to the time of this

study, no literature has indicated or reported on the progress of the NADICEST. Therefore the status of this noble venture cannot be further asserted.

In the tertiary institutions such as the universities, the activities of the National University Commission (NUC) at establishing a Management Information System (MIS) are commendable. The main focus of the MIS is to float a Nigerian University Management Information System (NUMIS). This should promote and facilitate on-line database accessibility to most federal, state and private universities. Each of these universities is expected to subscribe to these services.

The NUMIS subsystems would include databases on students' administration, finance and physical planning in the universities. Another subsystem would include the activities of the university libraries, which would lead to the development of huge bibliographic and textual databases as a basis for resource sharing. According to Sama'ila (1996:23) the concept of the Universities Information System is precipitated on the need to convert data from internal and external sources into information and to communicate that information in an appropriate form, to management at all levels at all functions to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible.

In the polytechnic, the National Board for Technical Education (NBTE) is concerned with the development of computerisation of the Nigeria polytechnic system. Nwosu, (2000:12) reported that NBTE has through its department of statistics and planning, provided the impetus for software development and this is being adopted by about 8 out of 17 federal polytechnics in the country. Those polytechnic so far involved are the Federal Polytechnic at Mubi, Kaura-Namoda, Auchi, Bauchi, Kaduna, Nasarawa, Bida, and Ede. According to Nwosu, these efforts were however inclined

towards the computerisation of the libraries. But the development of these bibliographic databases could pave way for an improved and coordinated database system of which these institutions could provide the needed nodal points for dissemination of information. In Niger State Nwosu, (2000:14) further observed that the involvement of the tertiary institutes in computerisation efforts such as Niger State Polytechnic, Zungeru, Federal College of Education, Kontagora and the National Cereals Research Institute (NCRI), Badeggi exemplifies further efforts at providing the necessary impetus for a networking connectivity leading to the creation of a data bank information system. These efforts as enumerated above are indeed welcome in our national effort at imbibing information technology in the dissemination of information.

2.6. Raw Materials Information System (RMIS):

The Raw Material Research and Development Council (RMRDC) provided another incisive example of an institutional effort that is providing a database for its management. Raw Materials Information System (RMIS) has in place a local area network (LAN) facility called RMRDC-NET. The programmes in use include the Oracle, CDS_ISIS and TINLIB software to enhance information processing and retrieval. A wide area network (WAN) is being considered in order to facilitate information sharing amongst its liaison offices nationwide. The WAN will also provide access to other research institutes and organisations within and outside Nigeria who could require information from the RMRDC.

Meanwhile, RMRDC-NET links all the computing system within the RMRDC headquarters in Abuja. The connectivity is made possible through 'thick Ethernet cable' that provide the backbone for the dissemination of information. The RMRDC-NET has about 90 nodal points. This effort has provided the backbone upon which the

establishment of the National Science And Technology Data Bank (NSTDB) was established.

The library of the RMRDC constitutes a sub-system of the RMIS. It is a special library fully automated. The library automation system in use is known as the X-LIB. The X-LIB is an in-house package developed in line with most database management systems. It could be run on most Pentium personal computers and could be upgraded for networking. It has four modules that consist of: acquisition; cataloguing; circulation and an inquiry/report-generating module. According to 1998 RMRDC annual report, the library's holdings stands at 4,500 volumes of books and 150 serial titles. The library also has about twenty CD-ROM databases, a CD-writer and digital camera. The library is also deeply involved with the RMRDC information dissemination and documentation programme. According to the 1988-1998 report, the library will be part of the programme for "establishing raw materials research and development information system".

2.7 Summary of the reviews

Information management has been a reoccurring issue in the advent of information explosion or the exponential growth of information due the hyperactive nature of information generating activities. More and more efforts are geared towards providing information services to particular areas and industry. This concept has led to the narrower term of management information system (MIS), which is primarily concerned with information activity of a corporate entity. This chapter has outlined some of the efforts in the build-up of databases in the country. It has also provided a sketchy background of other examples from the limited number of literature available.

The efforts at dissemination of information in corporate bodies such as government and private organisations, tertiary and research institution were briefly outlined. It is inevitable to discuss these issues without emphasizing the important role of information technology. Indeed, as has been evident throughout the review the place of information technology and the involvement of the computer cannot be neglected.

The review has also provided insight into some isolated efforts at the development of management information system in many institutions and organisation. These isolated efforts could perhaps provide the necessary platform of a coordinated effort at providing national data bank for both public and private utilisation.

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CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The purpose of this chapter is to discuss the methodology adopted for carrying out the research.

3.2 Research Method Adopted

The research was conducted as a case study. A case study method provides practices in analyzing problems set in a realistic context and arriving at practical solution. Noragh (1988:1). Thus the researcher was able to find answers to research questions proffered.

The case study method requires the same approach as the descriptive survey method of research. This has been found appropriate because according to Ndagi (1989:79): "it is concerned with the collection of data for the purpose of describing and interpreting existing conditions, prevailing practices, beliefs, attitudes, on-going process, etc." Since RMIS is to be investigated with a view to finding the extent of the utilisation of its services, this method is found appropriate for the study.

Another method found relevant here is the documentary research method. According to Goldhor (1972:16) "consultation of documentary sources" is part of a survey study technique. These documents shall include official reports, published procedures and operational manuals and guides. Reports and opinions of the principal officers in-charge of the RMIS is of paramount importance in realizing the goals of this research.

Opinions of researchers and users of the RMIS was sought to further explain any information gap existing between the RMIS and its utilisation. Informal interviews and

questionnaires had also provide additional channels. Visits to the RMIS Abuja was undertaken to explore further ground in the presentation of the analysis. In addition, all the research institutes involved with this study were visited. These institutes were located at Abuja, Kaduna and Zaria. The visit was necessary to adjudge on the ground evidence of the user satisfaction and extent of the services provided.

3.3. The Population of the Study

The population of the research is the whole research institutes under the supervision of the Federal Ministry of Science and Technology. There are seventeen research institutes and centers under the aegis of the Federal Ministry of Science and Technology. Please see Appendix 3 on page eighty-eight for a listing.

The subjects of the study was constituted as follows: (1) All the managers of the information system on the one hand; and, (2) the users who were research officers of the four research institutes studied within the auspices of the Federal Ministry of Science and Technology.

3.4. Sample and Sampling Technique

A purposive sampling method was adopted which arrived at the selection of the four research institutes sampled for this study. The choice of four research institutes was guided by the fact that they form part of the primary phase of the implementation of the RMIS. A purposive sampling method was therefore considered appropriate. The four research institute namely are: Raw Materials Research and Development Council (RMRDC) Abuja, National Institute for Pharmaceutical Research and Development (NIPRD) Abuja, National Institute for Trypanosomiasis Research (NITR) Kaduna and the National Research Institute for Chemical Technology (NARICT) Zaria.

The subjects of study are categorized into two. These are: (i) population of users or research officers who are staff within the sampled institutes; and, (ii) the information/systems managers of the four research institutes.

(i) There were a total of 400 research officers or users from these four sampled research institutes. However, the stratified sampling procedure was used to select 200 samples from this category for the purpose of this study. The staff lists from these institutes were used in the exercise. Two hundred questionnaires for the users response were distributed to those research officers stratified.

(ii) The second category of the subject of study were the information/systems manager. The whole population was put at ten officers, made up of head librarians and information managers. The break down shows that: four officers were from the RMRDC and two (2) each were from the other three research institutes.

3.5. Research Instruments

The basic instruments used to collect data/information for this study included the questionnaire, interviews, and, observation. These instruments have the advantage of providing economy of time, probe for additional and authentic information and throw further light and offer explanation on the survey conduct of research. The questionnaire was used to collect data from information/systems managers including the librarians in each of the sampled research institutes: the library being identified as a sub-system of the RMIS. The users of RMIS services form another subject for this study.

3.5.1 Questionnaire

Two types of questionnaires were constructed to collect information from the users of the RMIS and the information or systems managers. The questionnaire administered to the information/systems managers or librarians was made up of twenty-

six items in two sections. In this questionnaire, information such as the date when the RMIS was implemented, the administration or organisation, acquisition and processing of information and dissemination or service utilisation of the RMIS, from the managers' perspective was solicited for.

The second questionnaire for the system users contained seventeen questions divided into four sections. The first section sought background information; the second section raised the issue of ease of use; the third section was to know the variety of services enjoyed, while the fourth section wanted to know the extent of satisfaction of the services provided.

3.5.2 Interview

In addition, unstructured interview was applied in the conduct of the research with some managers in order to clarify certain ambiguity. Peil (1982:112), sees the interview as a veritable instrument because "the personal approach usually produces much more satisfactory results". The unstructured interview is to help in clarifying issues that might arise from the questionnaire or observations in the conduct of the research during visits to central hub of the RMIS and other research institutes associated with the network.

3.5.3 Observations

Observation was used to gather more facts on the procedural approaches and functions of the services of the RMIS. Users were closely observed during real-time operations on the information system. This was useful in finding out the problems involved with operational processes.

3.6 Method of Data Collection

Data for this study was collected using questionnaire. The questionnaire, which was in two parts, sought information from the management of the RMIS in respects of history and modalities. The second part of the questionnaire is drawn for the users. The administering of the questionnaire was done personally at each of the research institutes. During these exercises observation and interviews were inclusive in order to buttress the information emanating from the questionnaires.

3.7 Method of Data Analysis

The data from the questionnaires provided the platform for a descriptive analysis. Statistical representation and inferences was made thereof. The use of frequency and percentage tables provided for quantitative comparisons or analysis.

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CHAPTER FOUR DATA ANALYSIS AND PRESENTATION

4.1 Introduction

This chapter deals with the presentation, analysis and interpretation of the data collected for the study. The data collected and analyzed are discussed in the following subheadings.

4.2 Response rate

4.3 Descriptive Analysis

4.3.1 Organisation of the RMIS

4.3.2 Funding

4.3.3 Acquisition of Information by RMIS

4.3.4 Dissemination of Information by RMIS

4.3.5 Networking and Dissemination of Information

4.3.6 E-Mail Services and Dissemination of Information.

4.3.7 The Effect of RMIS Services on Users

4.3.8 Accessing the Services of RMIS

4.3.9 Extent/Impact of RMIS Services

4.3.10 Inaccessibility Problems

4.3.11 Level of Satisfaction with RMIS Services

4.2 Response Rate

A total of two hundred (200) copies of the questionnaire were administered to the first group of the population of the study, which constituted the research officers (users) of RMIS. Eighty-two percent (162) of the questionnaire were duly completed and returned.

The second category of the population or respondents was the information/systems managers. Ten questionnaires were administered and 5 (50.00%) of the questionnaire were duly returned. The reason for this was that both the information manager and the system manager belonging to the same establishment decided to respond only with one set of questionnaire. At the RMRDC two copies of each of the questionnaire were duly returned.

The study enjoyed a high rate of response due to the fact that the researcher was at the various institutes to administer and collect the questionnaire personally. Another factor was that of the official support rendered by the office of the Director in each of the institutes, which had encouraged the public officers to provide information. Tables 1 and 2 below show the response rate of the questionnaires.

Table 4.1: Response Rate of Information/System Managers

S/No	Organisation/Institutes	Questionnaire Distributed	Total Respondents	Percentage Respondents
1	Raw Material Research and Development Council (RMRDC), Abuja	4	2	20%
2	National Research Institute for Chemical Technology (NARICT) Zaria.	2	1	10%
3	National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja.	2	1	10%
4	National Institute for Traposonomiasis Research (NITR), Kaduna.	2	1	10%
	Total	10 (100%)	5	50%

Table 4.2: Response Rate of Research Officers/Users

S/No	Organisation/Institutes	Questionnaire Distributed	Total Respondents	Percentage Respondents
1	Raw Material Research and Development Council (RMRDC), Abuja	100	85	43%
2	National Research Institute for Chemical Technology (NARICT) Zaria.	40	30	15%
3	National Institute for Pharmaceutical Research and Development (NIPRD), Idu, Abuja.	30	25	13%
4	National Institute for Traposonomiasis Research (NITR), Kaduna.	30	22	11%
	Total	200 (100%)	162	82%

Table 4.3: Users/Research Officers by Qualification.

Qualification	Number Of Respondents	Percentage
Doctoral degree (PhDs)	14	8.64%
Masters (M.Sc./M.A.)	40	24.69%
Bachelor degrees (B.Sc./B.A.)	68	41.98%
Higher National Diploma (HND)	30	18.52%
National Diplomas/Certificates (ND)	10	6.17%
Total	162	100.00%

From table 4.3 above, it can be seen clearly that the bulk of RMIS users are holders of 1st degree and above. And it is interesting to note that in their response, all the respondents indicated that they have some working knowledge of the computer and have used the computer in one form or the other. This question was particularly useful in determining the extent of usage of the RMIS services by the research officers.

4.3 Descriptive analysis

The two sets of questionnaires were analyzed below as follows: In the first category (Appendix 1), the questionnaire addressed to the information/system managers was discussed from item 4.3.1 to 4.3.6. The second questionnaire (Appendix 2), addressed to the users/research officers of the RMIS provided the ground for the second part of this analysis, which is from item 4.3.7 to 4.3.11.

4.3.1 Organisation of the RMIS

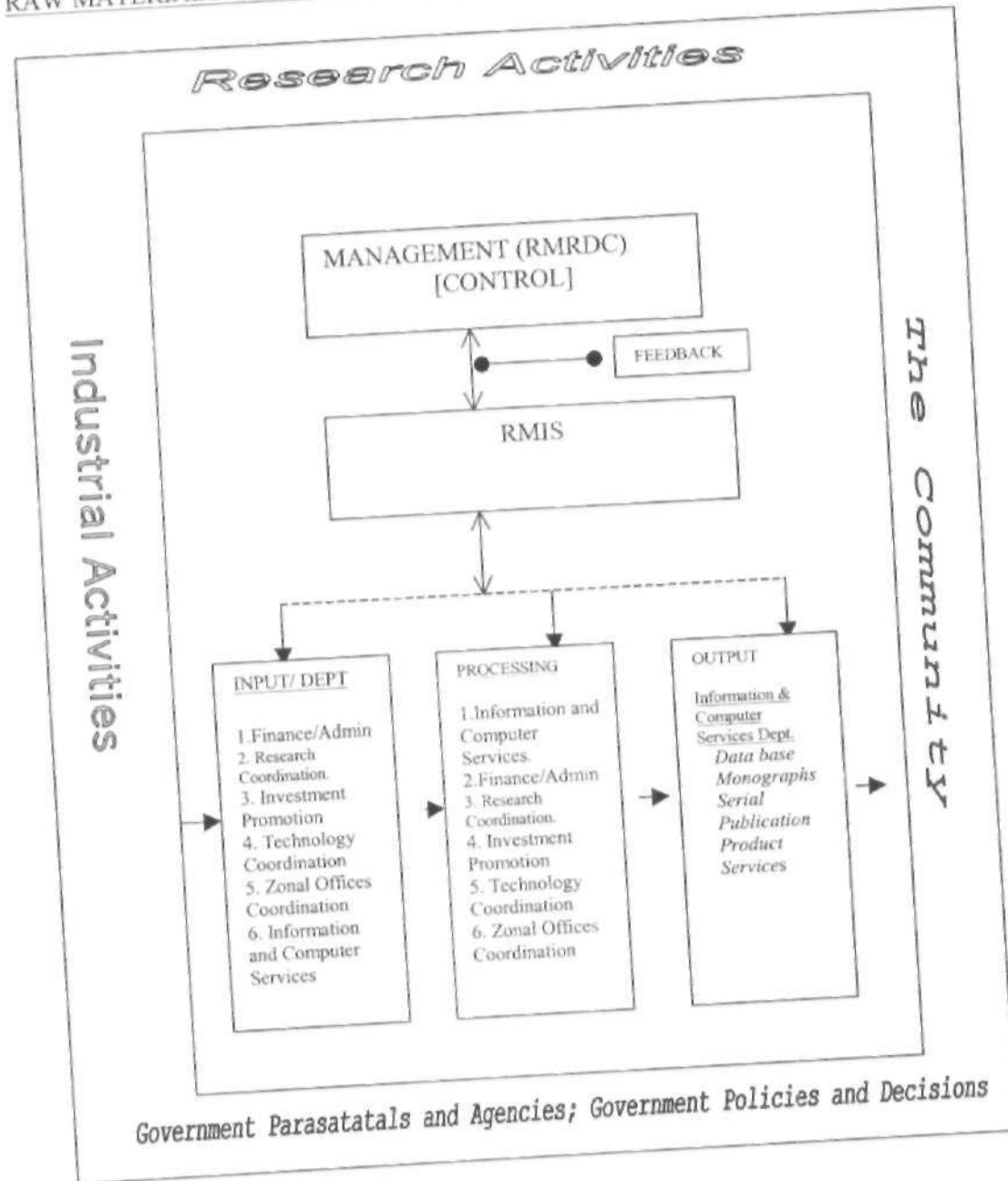
From the documentary evidence and interviews conducted with information/systems managers, the study discovered that the Raw Material Research and Development Council (RMRDC), Abuja established the Raw Material Information System (RMIS) in 1990. The RMRDC is a government parastatal under the auspices of the Federal Ministry of Science and Technology (FMST), Abuja. The RMIS was established to provide a repertoire of information, "a databank of

information on raw materials" available in Nigeria to appease investors and industrialists as well as to coordinate the sharing of information amongst research institutes under the auspices of the FMST.

The RMRDC is made up of six (6) departments. All the six departments are responsible for the input of data into the RMIS. The departments also handle the processing of information. However, the department of Information and Computer Services handle the output through the RMIS. Under the Information and Computer Services department, three sub-units were created. The units are: the Computer Services, the Library Services and the Documentation and the Publishing units.

The RMIS is an open/adaptive system. That is, a system that interacts with other systems within and outside its environment. It provides the enabling condition for a smooth interface interaction between management (controlling body) and end-users. It is also elastic as an adaptive system because it has the capacity to stretch or modify its operation to cope with the emerging demands resulting from the feedback processes. Below is a diagram depicting the raw material information system of the RMRDC Abuja, as an open/adaptive system.

Figure 1:
RAW MATERIALS INFORMATION SYSTEM AS AN OPEN/ADAPTIVE SYSTEM



The RMIS Staff

The RMIS has 58 personnel shared into its three divisions. The divisions are: computer services; library services and documentation and publishing. A deputy director heads each division. The deputy directors see to the day-to-day running of the information system and also act as data administrators (DA).

The system analysts/programmers constitute the technical backbone of the RMIS. They provide the core technical support to the running of the system. Other members of staff are classified as sundry staff. They provide services necessary for the running of the RMIS. They include computer operators, administrators and artisans who are responsible for data input and processing. The study revealed that the 'sundry staff' do not connote a lack of higher qualification. Rather some of these officers have attained higher national diplomas and degree certificates. However, the staff is a mixed grill of both intermediate and senior officers who are responsible for a variety of activities in the RMIS.

The study further discovered that the affiliated member institutions of the RMIS do not represent a similar systems approach. For example, in the National Research Institute for Chemical Technology (NARICT) Zaria, the location of the data office is within the office of the Director-General. It is put in place to harness the activities of information gathering and information dissemination. This reduces the information system to a rather closed system. It does not allow for wider participation and interactions; it is restricted to authorized users only. This unit is thus combined with library department for providing the necessary information services. As a result, input, processing and output of information could be carried out by one department, that is, either through the data office or through the library.

4.3.2 Funding

The Funding of any project is fundamental to its survival. This is an axiomatic statement that is even more relevant in the area of information gathering and dissemination in the face of the high cost of information technology. This truism led to the enquiry about the sources of funding for RMIS. All the respondents 5(100%) indicated that the source of funding the RMIS is through government budgetary allocations. However, in 1992, documentary evidence indicated that the United Nations Development Project (UNDP) provided an initial sum of US\$750,000.00 dollars for the initial take-off of the RMIS. (RMRDC 10th Anniversary Report, 2000:19). This provided the launch pad for the actualization of the RMIS. Since then, the RMIS has been relying on the meager allocation given to it by the RMRDC.

Theoretically therefore, it can be deduced that as a result of the central nature of policy making and policy decision regarding government allocation of resources, the RMIS could not be provided with all the required funding it would need for the proper running of the information system.

4.3.3 Acquisition of Information by the RMIS

The whole activity of the RMRDC provides the broad spectrum for generating information within the internal environment as well as sourcing for information from outside. It has been discovered that there is a thin line that separates the 'acquisition' and 'generating' of information in the RMIS.

The information acquisition and dissemination policy of the RMIS is derived from the broad policy statement of the RMRDC as defined in the Degree 39 of 1987 establishing the Raw Material Research and Development Council. The statement of

the objectives of the RMRDC also provides further articulation of the acquisition policy.

Ayo,(2000:228) provided a summary of the acquisition policies in a pragmatic order within the following circle of activities in the RMIS. These are:

- (i) Acquisition by private/official communication (telephone calls, letters, e-mail, etc.).
- (ii) Acquisition through books and other publications.
- (iii) Acquisition at annual conferences of professional bodies and at seminars/workshops.
- (iv) Manual extraction of information from questionnaires and publications and stored in files (and database files).

The information acquisition and dissemination policy is therefore supported through the provision of improved infrastructure such as the telephone system, postal system, electricity, computerization and networking within an enabling information communication technology environment.

Acquisition of Materials from Primary Source:

At the RMIS, acquisition activities involve the sourcing of information materials from two major ways. These are (i) primary sources; and, (ii) secondary source. The researcher graphically represented these circle of activities in a Flow Chart of acquisition and dissemination of information in RMIS. Appendix 4 on page 89 is a representation of the acquisition and dissemination flow of information based on the activities of the RMIS.

The RMRDC has through its techno-economic surveys of natural resources and technologies, and, its programme of national research and development set up the

'special multi-disciplinary task force committees'. These committees conduct specific study on special disciplines and areas of interest to the RMRDC. The data from such studies are used in creating information. This study has identified the activities of special multi-disciplinary committees as one major area of the acquisition of information materials as well as information generation. The study regards the reports and data generated as a primary source of information because the information are derived from direct reports and field studies.

There are presently a total of 10 such committees. These are:

1. Food, Beverage and Tobacco
2. Wood and Wood Products
3. Chemical and Pharmaceuticals
4. Pulp, Paper Products, Printing and Publishing.
5. Textile, Weaving Apparel and Leather.
6. Domestic and Industrial Plastics and Rubbers.
7. Base Metal, Iron, Steel, Metal Working, Industrial and Engineering Services.
8. Non-Metallic Minerals.
9. Motor Vehicles and Miscellaneous.
10. Electrical and Electronics.

The major task of each of these committees was to assemble and synthesis information on the various industrial sectors of the economy and the research and development activities of the areas enumerated. That is, the activities of these bodies or committees help in the segregation of information to meet particular group

interests. The end results of this information gathering, provides for an articulate listing of information in various aspects of research and development activities.

Another source of primary acquisition of information concerns the information activities of the 36 liaison offices in the states. The Department of Liaison offices generate primary information through its interactions with research institutes, prospective inventors or the entrepreneur as well as the industrialists. The activities of the zonal offices are also coordinated at the RMIS headquarters in Abuja. A spillover of the activities of the state liaison offices provides another source of primary information acquisition that can be disseminated to researchers and entrepreneurs on areas of investments and production.

Acquisition of Information Materials from Secondary Source:

The secondary source of acquisition of information is the library unit. The library unit has the traditional responsibility of acquiring information resources. This includes books and non-book materials. Information organization and packaging at the RMIS includes such activities as cataloguing, classification, indexing, current awareness and selective dissemination of information services. The library operates a dual record keeping service; a manual system and automated system. As a result, the activities of the library cover both the electronic data processing such as database files, e-mail services and on-line information services. Indexing and cataloguing services that are manually based are being phased out gradually and being replaced with the electronic database files.

However, for most of the research institutes that are affiliated with the RMIS such as NARICT, the take-off of the electronic system is slowed down due to lack of

equipment and technical know-how. In most of these institutions the manual systems of record keeping and dissemination of information still persist.

4.3.4 Dissemination of Information by RMIS

The processed information is disseminated to all the 36 liaison offices, the affiliated research institutes and external individuals and organizations, such as manufacturers, industrialists. The RMIS provides information services within the following profiles:

- (i) Information on raw materials available in the country;
- (ii) Information on on-going types of research and development projects in the country;
- (iii) Information on research facilities (such as workshops, laboratory equipments, books, audio-visual materials) housed in various organisation, tertiary institutions and research centers;
- (iv) Information on researchers' profiles in various organizations (such as their specialization, researches undertaken, publications, etc.)
- (v) Technical information on raw materials and their potentials for investment and industrialization.

The study also revealed that information dissemination by the RMIS is channeled through two major media. These are the manual medium and the electronic medium.

In respect of the electronic medium, a database is being developed using 'FoxPro' relational database management software. This database files is being housed within the hub of the RMIS. The following information is being made available on the database. These are:

- Profile of research organizations

- Profiles or researchers of the science and technology institutions.
- Research and Development work in various research organisations.
- Research and Development work by various scientists of research institutes of science and technology.
- Research and Development facilities in various research organizations and universities.
- Publications in various research organizations.
- Publications by various organizations.

The dissemination of information is aimed at harnessing resources for promoting research and development (R & D) activities in research and tertiary institutions in Nigeria.

A network of computers linking RMRDC and other research institutes and organizations is being put in place to promote the dissemination of information over longer distance. Computers are being accepted as an important element in running information system. Therefore, this study observed gladly that all the institutions under the study have acquired computers. The use to which these computers were put into is diverse. They were found in the administration and finance unit, where they are used for routine record keeping and payroll operations. They were also found in libraries where they are used for the operation of library services in different modules. The laboratories also have computers that were being used for scientific analysis such as the calculation of infrared (IR) spectral analysis, ultra violet (UV) spectral analysis, and atomic absorption spectrum analysis.

On the other hand, a manual system is prevalent in 4 out of the 5 of the sampled institutions. Such information as cataloguing, indexing and abstracting, and selective

dissemination of information was carried manually in these institutes. This represents eighty percent of the respondents. In addition lack of Internet connectivity compounded the problem of logging on the information highway to source information.

4.3.5 Networking and Dissemination of Information

Network Topology: The study discovered that the Raw Material Information System (RMIS) has a local area network (LAN) in place. At the RMIS office in Abuja, ninety-eight (98) computers were linked together. The nodal points or computers are spread around the complex, which is a two-story building. The network topology, compatibility and capacity of the operating environment and the end-user interface is being handled through a combination of the 'Star' and 'Bus' topologies.

The systems manager of RMIS refers to the combination of these two topologies as a "hybrid topology". In practice it combines fibre optic cabling as the central backbone cabling system to form a "Bus" topology. The connectivity within different enclaves of the network is done by using the Untwisted Pair (UTP) Category 5 (Cat 5) cable through the 'star' topology which links computer-to-computer within the same department or units.

Data transmission compatibility problem as a result of the combined topology is being handled through a 'protocol converter'. A protocol converter is a device that allows nodes or links from different cabling system in the computing network to communicate. They serve as booster stations. It thus provides the enabling interface between two otherwise incompatible physical media or cabling system. Thus it facilitates the transmission of data through two topologies and the use of two different

physical media—that is the combination of Untwisted Pair (Cat5) and the fibre optic cables.

For more elaborate explanations of the technicalities of these arrangements Eillion (1979:9-16); Miller and Beasley (1999?:467-519); presents good reading materials.

The Domain Server and the Proxy Server:

The LAN system in RMIS is segmented into the various departments of the RMRDC. Each department is placed on a proxy server. The domain server represents the major point of information direction and dissemination. The proxy servers are secondary means of providing additional speed and storage facilities for the smaller units that makes up the information system.

For example, the Library department has a proxy server allocated to it. This supports the ability of the library to provide online services to end-users directly. The library has a special CD facilitator, known as a 'juke box' that is connected to the library proxy server thus increasing the ability of the network for multiple access to the information services of the library.

The 'juke box' is capable of holding more than 250 CDs in its storage online. It then provides multiple access points to online end-users within the local area network. Contents from these CDs can be downloaded by interested end-users for their academic requirement.

All nodal points or computers are recognizable at the domain server. The domain server represents the main hub and it is central to all connectivity; it is a system that is run on an NT Windows operating system.

4.3.6 E-Mail Services and Dissemination of Information

Electronic Mail (e-mail) services have continued to provide an avenue for quick communication globally. At the RMIS, E-mail has become a major medium of communication amongst research officers in terms of information search and information exchange. Therefore in order to overcome the problem of telephone systems in Nigeria, the Very Small Aperture Terminal (VSAT) was installed by the RMRDC.

According to O'Brien (1996:288), many large corporations and other users (of electronic mail services) have developed networks of small satellite dish antennas known as VSAT to connect their distant work areas. These satellite networks are also called *bypass networks* because firms are bypassing the regular communication networks provided by commercial (public) carriers. This statement is visibly corroborated by the use of VSAT in most of computer-based information services and business centers in the country; and the RMIS in particular.

The RMIS has mounted its own VSAT to support the dissemination of information to a wider audience. With the VSAT put in place, a lot of possibilities are envisaged in terms of exchange of information amongst research institutes under the Federal Ministry of Science and Technology as well as the wider world.

The VSAT system consists of a hub station, which transmits data to a transponder on satellite for relaying to a number of small ground stations, each of which can usually transmit back to the hub via a satellite. Cawkell (1993:264). The VSAT technology offers a good opportunity for global communication far exceeding the provisions available on the public telephone network.

The RMRDC has created a Web Site with the address of the Web Site as WWW.RMRDC.ORG. The web page is decorated with the symbol of the Federal Republic of Nigeria on the right hand top margin and on the left hand top margin is the emblem of the RMRDC. The site contains a rich database on the availability and distribution of raw materials in Nigeria. The web site also provides other important profile information that could support research and development activities amongst research institutes. E-mail address has been provided on the web site for further exchange of information. It is expected that the affiliated institutes will enjoy from the venture.

Trade fair, workshops, seminars and conferences are considered as part of the efforts to provide wider dissemination of information by the RMIS. The RMIS documentation and publication department has been responsible for the publication and distribution of the RMRDC publications. The National Science and Technology Data Bank runs a serial publication entitled "Science and Technology Update" to keep subscribers aware of the development of the project.

4.3.7 The Use of RMIS Database Services

In order to analyse the effectiveness of the RMIS services provided for the users, four databases information profiles were considered. These are: (i) biographical database; (ii) bibliographical database; (iii) scientific database and (iv) industrial database.

The biographical database enlists names of research personnel, their area of research and relevant discussions on the subject matter. The bibliographical database is a compendium to the library catalogue lists. It provides information on the bibliographic materials available either within the RMIS or from other CDs available

in the library. The scientific database contains information about the availability of laboratory and scientific instrumentation useful for the researchers. It also enumerates the organisation housing these instrumentations so that they can be harnessed and shared by researchers from other institutions and organisations. The industrial database enlists the raw materials availability for potential exploitation and also provides information on how to add value to available raw materials to provide good substitute for imported ones.

Table 4.4: Analysis of Data base Services

Database Category	Frequency of Use per day	Percent
Biographical database	14	6.93%
Bibliographical database	24	11.88%
Scientific database	48	23.76%
Industrial database	50	24.75%
Library Services	66	32.67%
Frequency Total	202	100.00%

Therefore, the respondents were asked to state the type of services they enjoyed so far from the RMIS database service. From their response, the above table shows the extent of RMIS databases. 50(24.75%) calculated from the frequency counts indicated that they make extensive use of the industrial database in their research activities. This is perhaps not unconnected with seeking information on the available of data on raw material exploitation and utilization. The scientific database provides information about on-going scientific work either at the laboratory level or at the pilot plant level. 48(23.76%) of the users are fully aware of these potentials. However the library in its traditional role continues to enjoy an overwhelming presence of clientele as it indicated 66 or 32.67% patronage.

4.3.8 Accessing the RMIS

These access points are: (1) E-mail, (2) Wide Area Network (WAN), (3) Web Site access, (4) Telephone Service; other access points include (5) Database profiles, (6) Library collections and (7) Direct RMRDC Library service.

In the analysis below items 2 and 3, were merged into one category because of their relationship. Items 6 and 7 were also merged as library resources. This reduced the summary of the access points to 5. Table 4.3 below provides a breakdown of the analysis.

Table 4.5: Access point to the RMIS Services

Access Points	Users frequency per day	Percent
E-Mail Services	28	13.73%
WAN/Website	34	16.67%
Telephone Services	22	10.78%
Database files	32	15.69%
Library resources	88	43.14%
Total	204	100.00%

From the above table, the library resources represent 88 (43.14%) of the information disseminated to end-users. The RMRDC web site has also shown some indication of being accessed by about 34(17.00%) respondents. However the accessibility of the web site is subject to the availability of the Internet connectivity. Of all the institutions sampled, only two (RMRDC Abuja and NARICT Zaria) had access to the Internet. This also explains why the E-mail services and perhaps the database services are as low as 29.42% put together.

4.3.9 The Level of Usefulness of RMIS Services

Six areas of activities were identified to provide the basis for studying the usefulness of the RMIS to the academic and research and development (R & D)

activities of the end-users. The usefulness of the RMIS was measured on a Likert scale. The table below provides a summary of the number and degree of responses in terms of the impression or usefulness to the end-users.

Table 4.6: Level of Usefulness of the RMIS Services

Data base and the areas of activity	Level of Usefulness					Frequency Total
	Very Useful	Useful	Not Sure	Fairly useful	Not useful	
Writing research papers	6	17	2	3	0	28
Knowing about R & D activities	12	19	2	3	0	36
Contacting research personnel of similar profiles	8	12	4	6	0	30
Providing information on industrial projects	10	14	1	6	0	31
Providing raw materials information	25	18	1	1	0	45
Providing information on instrumentation	6	6	5	6	1	24
Total:	67	86	15	25	1	194
Percent	34.54%	44.33%	7.73%	12.89%	0.52%	100%

The number represented in the last column (to the right) was the total sum of the frequency counts in respect of each respondent as per his response. The questionnaire had presented a multi-faceted question as could be observed. Not every researcher has the same perception of the usefulness of each activity enumerated. Out of the total number of questionnaires returned (i.e. 162) 28 (17.00%) respondents did not answer this particular question analyzed above.

From the available figures therefore, a total of 86 (44.33%) agreed that the RMIS services have been 'useful' in all the areas of activities enumerated above while 67 (34.54%) of the respondents found the services of RMIS 'very useful'. The total sum of these two columns is 153(78.87%). This can be said to a healthy figure on the average. It is therefore possible to say that the RMIS services indicate an above average level of 'usefulness' to its users.

On the other hand, 25 (12.89%) agreed that the services were 'fairly useful' and 1(0.52%) indicated that the RMIS services were 'not useful'. In the same vein, a total of 15(7.73%) of the users were ambiguous about their level of satisfaction with the RMIS services. Thus the sum total from these three columns brought together provides the total of 41(21.13%). Therefore, the total number that indicated that RMIS services is being 'usefulness' far outweighs the total number of 'not useful'.

4.3.10 Problems of Access to RMIS

In order to find out the administrative and technical problems associated with the accessibility of information in the RMIS—in terms of real-time operation and ease of use or the user interface, eight areas were identified.

The tables below (i.e. Tables 4.5 and 4.6) provide the breakdown of the analysis in respect of the problems associated with accessing the RMIS.

In the first four questions the breakdown is as follows:

Table 4.7: Online Problems

Sr/No	Types of Problems	Respondents	Percent
1	Difficulty of operations	16	11.94%
2	Absence of online services	32	23.88%
3	Insufficient Information on databases	52	38.81%
4	Absence of analytical tools	34	25.37%
Total		134	100.00%

Only 72 respondents (44%) out of the 162 questionnaires responded to this set of questions. In the above table insufficient information on databases represent 38.81% of problems faced by users. It is envisaged that data administrators could handle such problem by providing a comprehensive listing of the database available through an index. All the other problems could be associated with lack of basic knowledge of computer operation.

In the second category of questions the following is the breakdown.

Table 4.8: Hardware/software problems

S/No	Type of Problems	Respondents	Percent
1	Lack of access to required information	30	41.67%
2	Lengthy wait-time period	24	33.33%
3	Software problems?	10	13.89%
4	Hardware problems?	8	11.11%
Total		72	100.00%

Seventy-Six or 47% of the respondents chose not to answer the questioned posed here. From the available respondents it has been noted that hardware and software problems are associated with technical aspects of computer operation. This study believes that such problems are not insurmountable. Suggestions on how to improve the RMIS services include providing handbooks and user-guides. It is also envisaged that the system analysts and programmers of the RMIS would be intimated well enough with the catalogue of the problems arising from the end-user through constant appraisal of the service utilisation. Therefore, users should be properly provided with operational guideline to reduce the risk of program crashing during real time operations.

4.3.11 Level of Satisfaction with RMIS Database Services

An overall satisfactory level of the RMIS services was measured on the end-users choosing a seven-category field of activity in respect of research and development. The levels of satisfaction were measured using a *Likert scale* approach. Five columns were provided for the each respondent to indicate his level of satisfaction. The middle course marked 'not sure' was meant for users who were not ready to provide direct answers. The figures in each of the boxes were sum total of the frequency counts provided by the respondents.

Table 4.9: Level of Satisfaction with RMIS Services

Databases Services	Level of Satisfaction					Total
	Very Satisfactory	Satisfactory	Not Sure	Fairly satisfactory	Not satisfactory	
Data base on raw materials	7	27	2	7	3	46
Database on Research and Development	3	17	3	4	7	34
Data base on industrial activities	0	18	7	7	4	36
Data base on scientific up date.	4	15	7	3	9	38
Library bibliographic database.	5	21	10	7	2	45
Database on instrumentation	0	9	9	11	6	35
Biographical Database	1	15	11	8	5	40
Total	20	122	49	47	36	274
Percentage	7.30%	44.53%	17.88%	17.15%	13.14%	100%

From the above table, the total figure for the 'not satisfactory', is put at 36(13.14%). The fact that 49(17.88) of the users were not sure about their level of satisfaction further gave expression to the low level of satisfaction. The two figures put together represents 85(31.02%) of the respondents.

On the other level, 122 (44.53%) users indicated their level of being 'satisfied' while 20(7.30%) were 'very satisfied'. These two figures represent a total of 142(51.83%). On the average it can positively be argued that 51.83% users have indicated that they are 'satisfied' with the services of the RMIS.

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CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

The purpose of this chapter is to provide a summary of the findings, draw conclusions and make recommendations. The chapter is subdivided as follows.

- 5.1 Summary of the study.
- 5.2 Summary of the findings.
- 5.3 Conclusions.
- 5.4 Recommendations.

5.1 Summary of the study

The purpose of this study was to investigate the activities of the Raw Materials Information System (RMIS), Abuja as an information dissemination organ. Therefore, the organizational structures of the RMIS and the information activities as well as the users of its services were studied.

To achieve the objective of the study, six research questions were raised. The research method adopted for the study was the descriptive/survey method. The population of the study consist of all the research institutes under the auspices of the Federal Ministry of Science and Technology (FMST). The subjects for the study were: (i) the research officers of the various research institutes under the FMST on the one hand; and, (ii) the information/system manager on the other.

A purposive sampling method was adopted in the choosing the four research institutes while the stratified sampling method was adopted to select 200 samples

from the research officers or end-users using the staff list made available by the institutes.

The instrument of research includes the questionnaire, unstructured interview and observations of the real-time operations. Furthermore documentary sources were employed to complement these findings.

Two sets of questionnaires were designed. One set of the questionnaire was directed at the information/systems managers. The questionnaire sought to collect data on the technical and administrative structures of the information system. The questionnaire was based on the first three research questions raised. Ten questionnaires were distributed to the information/systems managers.

The second questionnaire addresses the end-user. It was designed to evaluate the impact of the RMIS services on researchers and other users of the information services. Two hundred of these questionnaires were distributed in four sampled research institutes. This represents 50% of the total number of research officers in these organizations.

5.2 Summary of the Findings

1. The RMIS is made of 3 divisions under the department of information and computer services. The computer services and library services division constitutes the backbone of the RMIS. The documentation and publishing division also renders important services.
2. The study revealed that there was a wide gap between the availability of ICT equipment at the main hub of the RMIS (i.e. RMRDC Abuja) compared to what was obtainable at the affiliated institutes. This scenario

has hampered the smooth flow of information dissemination in all the affiliated research institutes.

3. The policy on acquisition is broadly derived from the statements of the aims and objectives as contained in Decree 39 of the 1987 establishing the RMRDC. In practice internal committees such as the Multi-Disciplinary Task-Force Committees are involved in information generation activities, while the library unit performs the traditional acquisitions method of acquiring information materials.
4. The study also revealed that the local area network which is a combination of the 'bus' and 'star' topologies, referred to as a 'hybrid topology' by the systems engineer in RMIS, is designed for improved data transmission within the large area of the RMRDC.
5. The study also appreciated the fact that the impact of the services of the RMIS is on a positive ascend. The findings revealed that 44% of users are presently being reached.
6. The findings also realized that more than 60% of the respondents had faced some problems during real-time operations. These problems were technically accentuated because of insufficient orientation made available to the users; or, administratively initiated because of the improper guide or training provided to the users.
7. However, the findings had indicated that about 51.83% of the users had expressed that on the average they are satisfied with the services of the RMIS.

5.3 Conclusions

The RMIS has provided information services that had contributed to the promotion of research and development activities within the research institutes under the auspices of the FMST. By this commitment it has also provided useful information services to a wider community including the educational sector such as the tertiary institutions as well as the manufacturing sector. It is therefore proven that a networked information system augments the capabilities of the RMIS to disseminate information qualitatively and quantitatively. The service rendered by the library section of the RMIS has also provided additional support to the researchers.

5.4 Recommendations

Some suggestions are outlined below based on the findings in the course of this study. However, because of the national outreach of the RMIS under the management of the RMRDC some of these recommendations may be found to be generally applicable. They are directed at improving on the role of information dissemination in research and development activities.

1. Information plays a major role in research and development (R & D) activity. All research institutes with the FMST should therefore be fully supported with the needed information system, which includes an improved automated library and the necessary information communication technology.
2. Since, many researchers in the country do not enjoy easy access to needed information either because they are remotely detached from accessing the information required or because the means of accessing information is capital intensive; the improvement of ICT in research

institutes will invariably support information generation and dissemination activities. The information resources can further be harnessed and properly shared amongst these organizations to promote research and development. This in itself will provide the impetus for national development.

3. All the research institutes under the auspices of the FMST should be networked; interlinked and provided with VSAT to improve the exchange of information and sharing of research findings. The extension of computing power, improved information flows and the creation of new linkages through networks would support continued innovation and also provide the needed improvement, socially and economically.
4. The universal access to information (which is similar to the concept of 'universal availability of information) should be encouraged by floating an information satellite in orbit by the federal government dedicated to the information needs of the Nigerian research institutes and thus promoting research and development activities.
5. Raw Materials Research Development Council, other research institutions, tertiary institutions and government agencies in the field of education, research and development activities should be prepared to incur additional expenses by providing for additional budgetary allocation towards information communication technology.
6. A network of networks should be encouraged in order to promote improved information system services within the country. Increasing

the number of databank sustained by research institutes can attain this. This type of information resource can promote research and development activities, which can have a direct impact on national development.

7. With the proper information communication technology infrastructure put in place, the following activities could further be achieved:
 - (a) Coordinating of all on-going research and development projects;
 - (b) Providing the appropriate database to facilitate the sharing of research facilities and equipment amongst researches and manufacturers;
 - (c) Providing a comprehensive database on researchers, their specialization, publications and accomplishments; and
 - (d) Promoting a national data bank as a repertoire of national information on the various areas of national interest.

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APPENDIX 1

Department of Library And Information Science,
Ahmadu Bello University,
Zaria.

23rd September, 2002

Dear Sir/Madam

**QUESTIONNAIRE ON THE STUDY OF
RAW MATERIAL INFORMATION SYSTEM**

The bearer, Malam Abu Yusufu is a postgraduate student of the department mentioned above. He is presently conducting a research on the topic entitled "Information Management and Service Utilisation of the Raw Materials Information System: A Survey of Selected Research Institutes in Nigeria". Please provide him with all the necessary assistance.

Thank you.

Signed

**INFORMATION MANAGEMENT AND SERVICE UTILISATION OF
RAW MATERIALS INFORMATION SYSTEM (RMIS):
QUESTIONNAIRE FOR MANAGERS**

QUESTIONNAIRE FOR MANAGERS OF RMIS

Section One: Management and Organisation of RMIS

- (a) When was the RMIS established?
- (b) Why was the RMIS established?
- (c) Who is the head of the management team of the RMIS? Tick only one option please
 - (i) Managing Director []
 - (ii) Administrative Director []
 - (iii) Technical Director []

- (d) How many technical staff is involved with RMIS?
- (e) How many Sections make up the RMIS?

- (f) Who Heads these Sections? Please enumerate
(Name of Section) (Rank of Head)

(Name of Section)	(Rank of Head)
.....
.....
.....
.....
.....

- (g) What are the duties and responsibilities of the various cadres of staff?

Management Cadre:

Technical Cadre:

Others:

- (h) What are the sources of funding the RMIS? Please tick as many as applicable.
- (i) Government budgetary allocation []
 - (ii) Special Grants from UN bodies []
 - (iii) Foreign Aid Agencies []
 - (iv) Internally generated funds []
 - (v) Non-Governmental agencies []
 - (vi) Corporate Grants from Nigerian Companies []
 - (viii) Others (Please list)

Section Two: Acquisition, Processing and Dissemination of Information by RMIS.

- (i) How is the acquisition of materials conducted?
- (j) Which department is primarily responsible for procurement of data/information?(Tick as many options as applicable)
- (i) Data office []
 - (ii) The Library []
 - (iii) Research Officers []
 - (iv) Agencies/Individuals []
 - (v) Affiliated institutes []
 - (vi) Others, please state.
- (k) How does the RMIS process data/information acquired? (Please tick many options as applicable)
- (i) Manual processing []
 - (ii) Electronic processing []
 - (iii) Batch processing []
 - (iv) Others, please enumerate?
- (l) How does RMIS disseminate information? (Please tick many options as applicable)
- (i) Through computer networks? []
 - (ii) E-Mail services []
 - (iii) RMIS Website []
 - (iv) CD-Rom databases []
 - (v) The library []
 - (vi) Serial publications []
 - (vii) Workshops/seminars []
 - (viii) Others, please specify?

- (m) Does the RMIS provide database services? [Y] / [N]
- (n) If yes, through which means? (Please tick many options as applicable)
- (i) On-line services []
 - (ii) E-Mail services []
 - (iii) On Compact Disks []
 - (iv) Batch processing []
 - (v) All of the above []
 - (vi) Others, please specify?
- (o) If not, why?
- (p) What is the nature of the RMIS databases? (Please tick many options as applicable)
- (i) Biographical database []
 - (ii) Bibliographic database []
 - (iii) Scientific database []
 - (iv) Industrial database []
 - (v) Others, please specify.
- (q) What is the structure of the RMIS network connectivity? (Please tick many options as applicable)
- (i) Switch system []
 - (ii) Hub system []
 - (iii) Wireless []
 - (iv) V-Sat []
 - (v) Telecom towers []
 - (vi) Distance on PC []
 - (vii) Full-duplex []
 - (viii) Half-duplex []
 - (ix) Simplex []
 - (x) Others, please specify?
- (r) Are researchers questions entertained through e-mail services? [Y] / [N]

(s) If yes, how frequent are the inquiries received?

	Most frequent	Frequent	Not sure	Rarely	None
Researchers					
Industrialists					
Trade Chambers					
Government officials					
Academic community					
Professional bodies					
Other bodies					

(l) If, not, why?

(u) Which other channels are available for the dissemination of information?
(Please tick as many options as applicable)

- (i) Extension services
- (ii) Publications
- (iii) Workshop/seminars
- (iv) Trade fairs
- (v) All of the above
- (vi) Others, please specify?

(v) Are the researchers aware of the RMIS activities?
[Y]/[N]

(w) If yes, how?

(x) If No, why?

(y) Who are the primary users of RMIS services?

(z) Who are the other users of the RMIS services?

**INFORMATION MANAGEMENT AND SERVICE UTILISATION OF
RAW MATERIALS INFORMATION SYSTEM (RMIS).
QUESTIONNAIRE FOR THE USERS**

QUESTIONNAIRE FOR USERS

1. Background information

(a) What is your highest qualification please?

- | | | |
|-------------------------|--------------------------|--------------------------|
| National Diploma | <input type="checkbox"/> | <input type="checkbox"/> |
| Higher National Diploma | <input type="checkbox"/> | <input type="checkbox"/> |
| B. A/B.Sc | <input type="checkbox"/> | <input type="checkbox"/> |
| M. A/M.Sc | <input type="checkbox"/> | <input type="checkbox"/> |
| Ph.D | <input type="checkbox"/> | <input type="checkbox"/> |

(b) Present Rank:

(c) Where is the location of your institute/organisation?

(d) Are you computer literate? [Y / N]

(e) If yes, what is the level of your competence?

- | | | |
|-------------------|--------------------------|--------------------------|
| 1. Very competent | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Competent | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Not sure | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Weak | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Very Weak | <input type="checkbox"/> | <input type="checkbox"/> |

(f) If not, why?

(g) Are you conversant with the Raw Material Information System (RMIS)?
[Y/ N]

(i) If yes, what is the level of your conversance? Tick one option please.

- | | | |
|--------------------|--------------------------|--------------------------|
| 1. Very conversant | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Conversant | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Not sure | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Weak | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Very Weak | <input type="checkbox"/> | <input type="checkbox"/> |

(j) If no, why?

Utilisation of Services of RMIS

(k) State the type of services you are enjoying so far from the RMIS? (Please tick as many options as applicable)

- (i) Biographical database []
- (ii) Bibliographical database []
- (iii) Scientific database []
- (iv) Industrial database []
- (v) Library services []
- (vi) Others. Please specify.

(l) How do you access the services provided by the RMIS? (Please tick as many options as applicable)

- (i) By E-mail []
- (ii) By wide area network []
- (iii) Accessing the website []
- (iv) Telephone services []
- (v) From database files in the computer unit []
- (vi) Through library collections []
- (vii) Direct access to RMRDC Library []
- (viii) Others, please specify?

(m) What do you use the RMIS services for and to what extent?

	Very Useful	Useful	Not Sure	Fairly useful	Not useful
Writing research papers					
Knowing about R & D activities					
Contacting research personnel of similar profiles					
Providing information on industrial projects					
Providing raw materials information					
Providing information on instrumentation					

Others. Please specify.....

(n) What are the technical problems you encountered while using the RMIS? Please tick.

- (i) Difficulty in operations []
- (ii) Absence of online services []
- (iii) Insufficient information on databases []
- (iv) Absence of analytical tools []
- (v) Others, please specify?

(o) What other problems do you encounter in using the RMIS services especially during the real-time operations?

- (i) Lack of access to required information []
(Please elaborate)
- (ii) Lengthy wait-time period []
(Please elaborate)
- (iii) Software problems? Please elaborate. []
(Please elaborate)
- (iv) Hardware problems? []
Please elaborate

(p) Please state your level of satisfaction with the RMIS services?

	Very Satisfactory	Satisfactory	Not Sure	Fairly satisfactory	Not satisfactory
Data base on raw materials					
Database on Research and Development					
Data base on industrial activities					
Data base on scientific up date.					
Library bibliographic database.					
Database on instrumentation					
Biographical Database					

Others, please specify?

(q) What suggestions would you provide for the improvement of the Raw Materials Information System?

(i) General problems?

(ii) Technical problems?

(iii) Administrative problems?

(iv) Others?

**LIST OF SOME RESEARCH INSTITUTES AND CENTRES WITH THE
FEDERAL MINISTRY OF SCIENCE AND TECHNOLOGY¹**

1. Raw Materials Research and Development Council, Abuja.
2. Sheda Science and Technology Complex, Abuja
3. National Institutes for Pharmaceutical Research and Development, Abuja.
4. National Science and Engineering Manufacturing Institute (NASEMI)
5. Project Development Institute (PRODA) Enugu
6. Federal Institute of Industrial Research, Oshodi.
7. National Research Institute for Chemical Technology, Zaria.
8. National Institute for Trypanosomiasis Research, Kaduna
9. Scientific Equipment Institute (SEDI) formerly Federal Science
Equipment Manufacturing Centre.
10. Hydraulic Equipment Development Institute, Kano.
11. Nigerian Building and Road Research Institute, (NBRRRI), Ota, Ogun
State.
12. National Metallurgical Development Centre, Jos.
13. Technology Business Incubation Centre (TBIC)
14. National Centre for Technological Development
15. National Office for Technological Acquisition and Promotion (NATAP)
16. Engineering Material Development Institute (EMDI), Akure, Ondo State
17. Technology Development and Advisory Centre (TEDAC)

¹ Sources: [Various publications]: Newsletters: Annual Reports: Official documents.

ACQUISITION AND DISSEMINATION OF INFORMATION IN RAW MATERIALS INFORMATION SYSTEM (RMIS) FLOW CHART

