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Developing Information Services for Special Library Users in Libya by Designing a Low Cost Digital Library

By

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‘This thesis is the result of the author’s original research. It has been composed by the author and has not been previously submitted for examination which has led to the award of a degree.’

Signed:

Date:

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ABSTRACT

This thesis has investigated the state of special libraries in Libya with the aim of improving the services provided to the users. It intended to complete the picture of special libraries in Libya by undertaking a survey of the current scenario of a sample set of special libraries in various sectors in Libya. This thesis has proposed a design for a low cost digital library to enhance the services currently provided and to reduce the number of problems faced by such libraries in terms of improving the services for end users.

This thesis has investigated a number of key issues affecting the special library in Libya and its services such as staffing, funding, and technical services. The role of special library services and their influence on the achievements of an organisation's overall goals has been explored, along with the problems facing special libraries in Libya which hinder their improvement. A wide range of services that are provided by special libraries in Libya have also been examined along with user viewpoints and opinions on the services delivered. This thesis has put today's technology into practice and has exploited the latest technology for developing special library services by designing a low cost digital library service as a practical solution. The outcomes have proven encouraging as the design has been shown to be cost effective. The design has also demonstrated that the digital library developed in this thesis can assist to a large degree in developing the services provided to special library users in Libya. This thesis has also shown that digital libraries ought not to be seen as an end in themselves, but rather as a means for enabling end users to access a variety and wide range of frequently required services.

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CHAPTER 1: INTRODUCTION

1. 1 Context and Motivation

Special libraries play a considerable role in supporting research activities and are widely considered essential libraries for the evolution of social, economic, and intellectual life in Libya (Saleh, 2003). Special libraries in Libya have expanded over the last decade through the establishment of large number of this type of library to serve research workers and the effectiveness of these libraries has been demonstrated through the provision of reasonably acceptable levels of service (Alsafy, 1996). The Foundation of National Scientific Research in Libya, which is responsible for the funding of research projects and studies in various scientific disciplines, has regarded the above-mentioned as noticeable progress towards the desired expansion in research activities in the country. Yet more attention needs to be paid and resources directed towards such libraries in order to sustain and maintain the improvement in research quality.

There is general agreement that a country, considered as a system, consists of a number of sub-systems, e.g. the educational system, health system, etc., and that each of these needs its own specialised information system which can then form part of a national information system (Aziz, 2000). Studying the special libraries which provide many of these information services to users in an organisation needs to be undertaken in order to improve performance across all research fields and this should reflect positively on the total economy of the state. Furthermore, relying on traditional methods of providing library services in libraries in general, and in special libraries in particular has proved not to be the path to success. Therefore, a shift to the application of information technology would seem to be essential to give these institutions the capability of providing reliable services to users. It is also important to point out in this context that IT presents new opportunities and challenges for libraries in general and special libraries in particular such as access to scientific information easier and faster than ever before. Special libraries are passing through a phase of dramatic change due to the ongoing challenges being posed by IT such as the challenges of moving the special library to a more online environment – new systems and services. Accordingly, they need to re-envision their role and to explore new ways to address the changes introduced by IT to be able to serve the experts, scientists, and research workers who demand high quality and reliable services. Most scientific information today is available in a variety of formats and across a variety of channels

such as CDs, DVD, Internet web sites, portals, gateways, repositories etc., which require knowledge of specialised information handling techniques such as knowledge of using and implementing metadata, online cataloging, archiving of websites and so on. Therefore qualified and well-trained staff employing modern technologies are needed to raise technical and user services to a more efficient and effective level and to enhance and foster productivity and the expansion of research activity. It is assumed that special libraries in developing countries need to modernise and implement their ICT infrastructure and articulate information policies that will facilitate the exploitation of information resources to the optimum to increase national productivity. It is hoped that improving ICT infrastructure and the research environment will create new business and facilitate industrial research. This in turn will foster and enhance the total economy.

Special libraries in Libya are suffering from many serious problems such as inadequate financial support, lack of qualified librarians, lack of access to up-to-date electronic resources and so forth. Accordingly, undertaking this research was an important step for establishing the status of these libraries and for developing their services to an effective level by utilising information technology. In the light of the importance of today's technology for improving library services, and the recommendation of the World Summit on Information Society (WSIS,2005) regarding exploiting modern IT to foster productivity and the expansion of research activity, the researcher came to the decision to build a low cost digital library to enhance special library services in Libya.

1. 2 Statement of the Problem

A number of studies have investigated the status of special libraries in Libya as discussed in chapter two. The results of these studies have revealed that the services currently provided by such type of libraries in Libya are weak and that more attention needs to be paid to trends and technologies in order to remain relevant and to improve the services presented to special library users. However, a number of special library sectors were not included in the aforementioned studies. Consequently, a full picture of special libraries in Libya is not currently available. In order to discover the actual status of this category of libraries across all sectors in Libya there was a need to undertake a survey of the current state of special libraries in various sectors. It was assumed that by so doing the problems facing this type of library would be eliminated and the services provided to special library users would be improved. This research

also originates from a belief that information services for special library users in Libya are poor and not well developed because they suffer from a general weakness in their equipment, ICT infrastructure, resources, and staff making them unable to meet their obligations towards their users. This belief based on field visits and observation which were conducted as part of the educational curriculum for undergradguate students in the department of library science at Garyounis University. Developing special library services and activities in Libya should be achievable through implementing and exploiting IT. It is important to point out that IT in this context can be divided into two main areas that are IT- producing and IT-using sectors. Therefore, a distinction has to be made between both areas. Derrick (2003) view the IT-producing sector as a sector that contains the manufacturing of computers, semiconductors, or telecommunications hardware or provides software and services that enable these technologies to be used effectively in organisations. The IT- using sectors are all other sectors of the economy i.e. Agriculture sector, Industry sector, or Services sector that apply IT as part of their operations in order to achieve greater efficiency and effectiveness. Designing low cost digital library services and introducing electronic services for special library users in Libya is expected to assist in solving many problems, such as scarcity of electronic resources and absence of access to up-to-date information resources in addition to meeting the needs and requirements of users. In this context, the reasons for undertaking this research were:

- Many of the librarians who are in charge of running special libraries in Libya do not possess a sound understanding of the theory behind special library work. This is evident from the current level of the services provided to users. Some librarians do not understand fully the role of a special library in supporting research activities and accelerating the advancement needed to make life better in addition to its essential role in building an integrated information system which should improve scientific research activities in the country and provide the required resources and services for research workers in all fields.
- The issue of IT in special libraries in Libya is an important one and should be considered as a high priority due to its potential contribution to the development of these libraries since IT has been proved to be the right path for economic development. Take Malaysia for example. This country advanced from a third world country to developed nation status in less than two decades. The country's economy was agriculture based and subsequently shifted towards manufacturing. Olan (2002) reports that "computer technology has been at the core for this transition and the country was successful in attracting some high tech companies such as

Motorola, Dell, and Intel. Because of this strategy, Malaysia now ranks among the world's largest suppliers of semiconductors". This vision and strategy can serve as a model for developing countries. The importance of IT was also affirmed by Daveri (2001) he states that "the return to growth of the US economy in the 1990s, and in particular its accelerated growth in the second half of the decade, are mostly credited to the increased contribution of IT". Therefore, special libraries in Libya should apply and implement IT to be able carry out their mission and to improve the services provided to targeted users.

This research attempts to assess the state of play in special libraries in Libya in order to shed light on the services provided to their users. It is also important to evaluate and appraise the current state of information services in order to improve their efficiency and determine to what extent the services offered have been successful in meeting user needs and requirements. Special library services cannot be reliable and efficient without a number of fundamental components. Fundamental requirements include buildings, holdings, equipment, budget, and qualified staff. These components are essential in order to achieve the library's overall goals and provide special libraries with the power and the capability needed for providing services to the users they serve. The weakness of any one component might lead to the inability to fulfill the duties and goals of the libraries. Therefore, this study attempts to establish the real status of these libraries by exploring their service programmes and technical services, which should help to place these libraries on the path to success in terms of being able to provide efficient services to their users.

1. 3 The Importance of This Research

The significance of this research lies in identifying the problems and the obstacles facing current services by exploring and focusing on the following areas;

- The ways of providing information services and the quality of the services presented to user.
- Investigation of the status of the ICT infrastructure in special libraries and the requirements for establishing low cost digital library services and providing electronic services in order to improve the services provided to special library users.
- Identification of the types of information resources and services that are most commonly required by various categories of special library users.

- The provision of contemporary and accurate data for the institutions responsible for strategic and developmental planning in Libya on special libraries.
- The dissemination of the research results will be of particular value to managers and information professionals within the different sectors covered by the research.
- Assisting in the establishment of a national information system, which should include all research centres, documentation centres, and special libraries in Libya as a network of specialised databases which provide services to the users in a co-operative way.

1. 4 Research Questions

Previous studies on special libraries in Libya e.g. (Mabrok, 2004) and (Hasan, 2003) have failed to examine the actual state of special library services or to develop practical solutions for current problems. The latter study focused on information services in medical institutes in Tripoli-Libya. It concentrated on the availability of several information services in some specialised libraries in order to get a clearer view of the services provided to target users during the period 2002 – 2003. A random sample of libraries was selected to represent the sector of health. The study arrived at the following results:

- The standards of the provided services was very low.
- Various information services such as current awareness service and SDI service, which are supposed to be provided to library clients, were found to be very weak.
- There was a lack of necessary financial support to provide required services in addition to a lack of cooperative programmes between libraries in the health sector.

Most research undertaken in this domain has focused on one sector with other sectors being neglected or excluded for whatever reason. Consequently, a full picture of special libraries in Libya is not currently available. This research intends to complete the picture of special libraries in Libya by undertaking a survey of the current state of a sample set of special libraries in various sectors in Libya. It also seeks to propose a design for low cost digital library services that should significantly assist in reducing the number of problems faced by such libraries in terms of improving the services for end users. In order to complete this picture of special libraries in Libya, this research will aim at answering the following questions:

- What are the major problems facing special libraries in Libya in providing efficient and effective services to targeted end users?

- What are the services and resources most frequently required by special library users and what problems face them in terms of getting the required resources?
- What are the obstacles and hindrances facing special libraries in Libya which hinder their improvement?
- What is the status of special libraries in Libya with respect to ICT infrastructure, user services, and management policies?
- What ICT infrastructure is available in Libya at the present time for building an appropriate digital library and providing electronic library services?
- What is the gap between the current and required infrastructure and how can that be filled?
- How can IT be used to improve information services for special library users?
- What kinds of services are provided to user and what is the quality of the services presented?

The aim of this thesis is to identify the problems which face special libraries in Libya with respect to ICT infrastructure, user services, and management policies. It is expected that investigating these areas will form part of the solution needed to improve the current state of special libraries and to improve overall services. This research also aims at clarifying the current level of provision of special library services in Libya. This will provide a fuller picture of the services available to users and this, in turn, should assist in addressing the obstacles which these libraries are facing in providing high quality services. Applying IT applications by designing appropriate digital library services is also expected to support research activities in parent organisations and this, in turn, should improve the total economy of the state.

1. 5 Research Objectives

The broad objectives of this research are as follows:

- To investigate the current state of information services in special libraries in Libya.
- To identify the problems facing information services, technical services, ICT infrastructure and management policies.
- To design low cost digital library services to suit the needs of special library users.
- To provide recommendations and guidelines for policy makers.
- Establishing a clear picture of special libraries in Libya, supported by statistics, of the obstacles hindering improvement, and of the problems facing this type of libraries.

- Improving our understanding of the extent to which these libraries have been successful in adopting and using IT in comparison with some special libraries in the Arab world.
- Evaluating the extent to which special libraries in Libya can contribute and assist in establishing a national information system.
- Assessing the possibilities of establishing a co-operative system among special libraries in Libya to improve research activities.

1. 6 Research Outcomes

There are a number of outcomes, in terms of deliverables, which this research will produce:

- A clearer picture of the state of information services for special library users with respect to the level of services, user needs, ICT infrastructure and management policies, information skills and user requirements, and library management including special library staff.
- A report on the specific information resources and services that are most commonly required by various categories of special library users.
- A design for a low cost digital library based on the services that are most frequently required by users.
- Guidelines for the design of a low cost digital library suitable for users in Libya, and similar countries in the Arabic speaking and the developing world.

In terms of learning outcomes, this research will assist the researcher in exploring new ways of developing special library services by exploiting modern technology. It will also assist in understanding how problems can be solved by implementing and using today's technologies. The research outcomes will also help in understanding the nature of the more advanced library services in developed countries and how developing countries can achieve that level of service by articulating information policies that encourage the use of modern ICT and exploit freely available open source software. This research will also assist in understanding how the problems of special libraries in Libya can be resolved. This will be done by providing a practical solution capable of addressing many of the constraints and barriers that face these libraries and hinder them in reaching the standard level of services by designing low cost digital library services and introducing electronic services.

1. 7 Research Methods

A mixed approach, which consisted of a variety of research methods and data collection techniques, was used in this research. A descriptive research method was used for the first

phase of this research through the application of survey techniques. A mixed research design including qualitative and quantitative methods was used in a complementary fashion in this study to explore the research objectives. Three questionnaires were designed to collect general and basic data for the research. This assisted the researcher in driving the information necessary to achieve the research objectives described in 1.5. Data for this research was gathered from selected special libraries through personal interviews with librarians and people in charge of running special libraries in Libya. Observation and field visits were also used as tools to collect additional data. Statistical techniques were employed to analyse the data in order to obtain information that would assist in answering the research questions.

The second phase of this research was based on the findings of the first phase and involved the design of an appropriate digital library service to assist in developing current services. An experimental and system design approach was used for this phase of the research. In this stage, one sector of special libraries in Libya was chosen according to its significant contribution to the economy of the state. The second phase of this research focused on developing a low cost digital library to suit the needs and requirements of special library users and to provide services that are most frequently required by selected users. The design was aimed not only at providing access to or retrieval of information but rather, to deliver electronic services to special library users. Based on the findings of the first phase, the research identified a number of special collections – printed and /or digital – that are of importance to users of the National Oil Corporation, and a user-centred digital library was designed to meet user requirements.

The third phase of this research was based on the second phase and involved the evaluation of the prototype digital library which was designed for the NOC. For the prototype digital library, a usability–centred approach was applied to evaluate user perceptions as to the ease of the use of the prototype library and to assess user satisfaction. To achieve the evaluation of the prototype library, the work was divided into different phases, each stage was subdivided into steps and each further step contained a series of tasks. Thus, the total work was broken down into manageable portions.

1. 8 Contribution of This Research

This thesis makes the following contributions to the field:

1. Developing a new policy that positions information technology applications, and especially open source software, as part of a strategic plan for enhancing special library services.

2. The adoption and exploitation of today's technology in a time of shrinking budgets has become more important than ever. This thesis proposes a new strategy for developing special library services by adopting and utilising open source software since building repositories and digital libraries by using freely available software can assist to a large degree in enhancing the level of the services provided to users.

3. An institutional repository and digital library is a new concept for collecting, managing, disseminating, and preserving research works created in digital form by researchers in individual organisations and institutions. These tools can assist in narrowing the digital divide or the digital gap (through knowledge sharing) between the third world countries and developed countries which continues to widen between the have and have-nots, or the information rich and the information poor. This in its turn can have positive impact as an instrument for sustainable economic development.

4. The promotion of open source content management systems (CMS) in a non-English environment, e.g. the Arabic language, will help to endorse international and inter-cultural understanding and awareness, provide resources to researchers, expand non-English and non-Western content on the Internet, and contribute to scholarly research.

5. The promotion of the Budapest open access initiative by encouraging decision-makers to make their collections available online so that users can have easy access to vast and diverse resources.

1. 9 Dissertation Structure

This thesis investigates the current state of special libraries in Libya with the aim of designing low cost digital library services. The thesis is divided into the following chapters:

Chapter 1

Presents the introduction, which incorporates a statement of the research problem, research questions, research objectives, research methods, and research contributions, etc.

Chapter 2

Conducts an extensive review of the literature on special libraries. It reviews what has been written on special libraries in Libya, as well as on special libraries in some other Arabic countries, in order to obtain a clearer view of the actual level of services provided and to compare special library services in Libya and Arabic countries. It reviews literature written on

the impact of IT on library services and addresses the degree to which digital libraries can help enhance library services. It also addresses the problems of designing digital libraries.

Chapter 3

Outlines the methodology used in this research and reviews the stages and phases of the research. It explains how the first survey was conducted and discusses the sampling frame. It explains why a descriptive method was applied and what tools were used for gathering the required data. It also presents the second stage of this research, which comprised the design of a prototype digital library for the National Oil Corporation in Libya and explains how the digital library was designed.

Chapter 4

Covers the analysis of the questionnaires completed by users and librarians, and an additional questionnaire which was distributed to managers of information units to gather information pertaining to information policies in special libraries in Libya.

Chapter 5

Presents the findings of the first survey and discusses the results.

Chapter 6

Addresses the design of low cost digital library services for special library users in Libya. It presents the design stages and the steps involved in designing the proposed library. User studies, user requirements, etc. are included in this chapter.

Chapter 7

Discusses the evaluation of the prototype and reviews the analysis of the questionnaire, which was used for gathering data and information pertaining to the system. User opinions and views on the new system are presented in this chapter.

Chapter 8

Presents general guidelines for the design of a low cost digital library for special library users in developing countries and the Arabic speaking world. This chapter is considered to be one of the most important outcomes of this research and has been published in World Library and Information Congress: 75th IFLA General Conference and Council. Milan, 23-27 August, 2009.

Chapter 9

Completes this thesis, presenting the key conclusions and summarising the main contributions of this research .

CHAPTER 2: LITERATURE REVIEW

This chapter begins with a review of definitions of special libraries followed by an overview of Libya. This is followed by a general overview of special libraries in the Arab regions and a review of the impact of ITon special library services. The last part of the literature review looks at definitions of digital library which, like those of special libraries, vary considerably. The literature review has been used to inform the design of a low cost digital library suitable for special library users in Libya using Greenstone software to improve the level of the services provided and to suit the diverse needs and requirements of users in a changeable electronic environment.

2.1 Definitions of Special Library

The question, what is a special library, which may seem on the surface to be simple, proves to be complicated when trying to find a clear-cut definition. Some professionals, who see subject specialisation as the most significant features of a special library, view it as a library concerned almost exclusively with the literature of a particular subject. Therefore, libraries may be special on the basis of the specific subjects with which they deal (e.g. economics, agriculture, astronomy etc) while others define a special library on the basis of the services it offered(e.g. indexing and abstracting service, SDI service, current awareness service, and translation service). Some experts define a special library in accordance with the community it serves, while others consider the characteristics of the collections as the most important features. There is, therefore no doubt that there are many different views in the literature as to the actual nature of special libraries. Since there has never been a universally accepted definition of a special library, this thesis does not intend to provide a comprehensive collection of definitions, but rather to review a number of representative definitions. This problem has been a persistent one. In 1925 Ridley concluded (Ridley, 1925) “an entirely satisfactory definition has still to be established particularly in view of the confusion of ideas which exist with regard to the group of organisations which are known variously as special libraries, special collections etc.”

More recently, the Encyclopaedia of Library and Information Science reaffirmed this view stating that, “A clear, distinct, and generally accepted definition has not yet been developed, although many have presented their suggestions since beginning of this century” (Kent, 2003). The encyclopaedia provides 29 definitions in a chronological order ranging from 1910 to 1976.

Although the definitions listed in the table vary to some extent from each other, it has been stated that all definitions are in use and acceptable to the research community.

The definition of special library became more complicated due to consistent efforts that have been made by the research community. In 1966, Anstall concluded (Anstall, 1966) that “special libraries serve the specialist clientele, located within a single establishment or group, and all are engaged in working towards one common purpose”. He emphasised the specialist user and common purpose of the organisation. One year later in 1967 Ashworth concluded (Ashworth, 1967) that “a special library is a library, which is established to obtain and exploit specialised information for the private advantage of the organisation that provides its financial support”.

White (1984) said that “a special library deals with a specialised clientele or specialised materials or with a combination of both.

The handbook of special librarianship and information work (Scammell, 1997) asserts that “a special library is a term for a library that is neither an academic or school library, or a public library. Special libraries may include law libraries, news libraries, corporate libraries, museum libraries, and medical libraries. Special libraries are also sometimes known as information centres." Special libraries often have a more specific clientele than libraries in traditional educational or public settings, and deal with only a specialised or particular type of information.” UNESCO and ISO provide a relatively comprehensive definition of the special library in 1958 and 1982. UNESCO had this proposal to make in 1958: (Anon, 1958) “Special libraries are primarily designed to serve a limited number of experts, scientists, research workers, etc, and not coming within any of the categories (national, university, and school libraries). Their holdings in particular, relate to one subject (e.g. agriculture, medicine, history, economics etc.) These libraries may be attached to various bodies such as parliament or government department, a scientific or research institution, a learned society, professional association, museum, industrial association , chamber of commerce, etc.”

The International Standards Organisation (ISO, 1982) defines special libraries as “those maintained by an association, government, parliament, research institutions, learned society, professional associations, museum, business firm, industrial enterprise, chamber of commerce.etc, or other organised group, a greater part of their collection being in a specific field or subject, e.g. natural sciences, social sciences, agricultural, chemistry, medicine, economics, engineering, law, and history”. The UNESCO and ISO definitions stress the aspects

of parent organisations and specific subjects. Therefore, they are more relevant than previously stated definitions.

The Australian Library and information Association (ALIA, 2006) defines special libraries as "libraries, which provide specialised services; serve a particular clientele; or have special collections. The term incorporates information centre and resources centre".

It can be clearly seen that there has not been a consensus on the definition of a special library in the research community. For the purpose of this thesis a special library has been defined as having the following features:

- It is a library that provides its services to groups of users with special interest;
- It holds specific resources related to these interests;
- It deals with only a specialised or particular type of information;
- It belongs to specified organisations or institutions; and
- It is different from public libraries, national libraries, university libraries, and school libraries in many ways (services, collections, target users)

As regards any differences between special libraries and information centres, a number of professionals see them as one and the same institution. The definition provided by ALIA and Scammell suggest that the term information centre is equivalent to the term special library. Therefore, both terms are in use and still used interchangeably in many countries over the world. A study conducted in 1998 by Spiller (Spiller, 1998) and others in the Department of Information and Library Studies at the University of Loughborough titled "libraries in the workplace" revealed that the term information centre was still widely used in the UK. The study covered nearly 900 special libraries in the United Kingdom in different sectors. One of the results of the study was that nearly half of librarians (47%) still used the term information centre. This indicates that the term information centre is still used interchangeably even in developed countries.

As regards the designations used for the special library, (Strauss, 1972) provides a number of designations known to be in use. Some of them are listed below:

- Scientific library
- Technical library
- Technical information service
- Technical information division

- Information centre
- Research library
- Research centre library
- Research laboratory library
- Research and development library

(Singh, 2005) reports that in the late 1950s, the volume of information and the opportunities to apply new information transfer technologies, led to the establishment of a new type of organisation, called technical information centres or information centres. It was assumed at that time that they differed from libraries in dealing more extensively with non-traditional literature, such as reports, records, designs and drawings, etc., as opposed to books and periodicals. Further, these centres were supposed to take the responsibility of subject analysis of the collection and use computers and other advanced technologies to meet the challenging problems of retrieving and transferring the required information when needed. This confirms that real and significant distinctions between special libraries and information centres do not exist and that both types of organisation have the same objectives. However, information centres are often better equipped and use advanced technologies to overcome the problems of storage, retrieval and accessing information.

2.2 The Role of Special Libraries

Special libraries have played a significant role in preserving, organizing, and accessing information for some time. Despite the fact that the special library is a twentieth century phenomenon, there were many libraries in the nineteenth century that were performing the function of special libraries although they were not referred to as such. The twentieth century has been regarded as an era of special libraries worldwide especially in industrialised countries (Singh, 2005). This type of library has emerged due to the specialised needs of the community served by them and have become central to the progress of any business, industry, research organisation or government body.

A special library exists to serve the organisation which financially supports it. As a special library exists to further the objectives of the parent organisation, its objectives should be aligned with the aspirations of the parent body and it should work within the framework of the parent organisation (Dias, 1989). A special library is subject to any organisational policies regarding job descriptions, wages and salary policies, etc.

Special libraries are typically located with private corporations, business institutes, industries, trade unions and communities, scientific associations, research institutes of various affiliations, parliaments, government departments, etc. " Special libraries make a direct contribution to the organisation's goal and depend directly on their funding bodies. Conversely, the specific requirements of the funding bodies of special libraries are frequently directly dependent on the performance and quality of the library" (Ball, 2000).

The collections of a special library consist of information materials that have been acquired, organised, and administered for the library's clientele. To facilitate their effective and reasonable use, the collections must be balanced and comprehensive in the main interest areas of the organisation the library serves" (Otike, 1990). The special library collection may include books, scientific journals, newspapers, press releases, dissertations, yearbooks, reports, directories, indexing and abstracting materials, technical reports, patents, specifications and standards, audio-visual materials, electronic resources, and special collections such as maps, manuscripts.

As regard the services offered, special libraries provide lending and reader services in line with what other types of libraries provide but are best known for their specialised services. For example current awareness services are more commonly found in special libraries than in other

types. Selective dissemination of information is one of the most distinctive services provided by the special library. Abstracting and indexing services are also features of special libraries, particularly research libraries, as are translation services (Otike, 1990).

As regards staff, today's special librarians undertake far more extensive work than just locating and collecting data. Using the internet and other current technologies they also evaluate, analyse, organise, and present information in a way that maximises its usefulness. A few examples of the diverse services that special librarians may perform include (Wittwer, 2001):

- Preparing research reports in response to staff requests for specific information
- Gathering competitive intelligence
- Identifying research done at other organisations to avoid unnecessary duplication
- Verifying facts for external and internal reports and publications
- Creating databases for organisations to access their internal information
- Searching patents and trademarks
- Evaluating and comparing information software and sources of data prior to purchase
- Training other staff to use online databases efficiently and cost-effectively.

In special libraries staff consist of employees with different specialisations. However, the size of the staff depends on various factors such as (Singh, 2005):

- Is it a new library or one already in existence?
- Does the library operate manually or is it automated?
- What are the number and types of services being offered?
- Does the library have only print resources or does it acquire electronic resources as well?
- What is the size of the parent organisation and the number of users to be served?

A special library or information centre uses a number of processes in day-to-day activities. Among the value added activities are (Matthews, 2002):

- Selection and acquisition
- Serials control/ claiming
- Creation of abstracts or enhanced bibliographic records
- Selective dissemination of information
- Current awareness services
- Providing access to online resources
- Providing reference services

- Timely document delivery service
- Outsourcing activities
- Retrospective search; and
- Evaluating and recommending online resources

This section has explained the role of special libraries in the twentieth century. It has enlightened their duties and functions and highlighted where they are typically located. This section has also highlighted the type of the services usually provided to special library users and clarified how these services differ from other types of libraries.

The following section incorporates an overview of Libya and highlighted the country profile. It is written to give general information about Libya from different perspectives. It shed lights on the location of Libya, where the country is situated in Africa and the population of the country. The following section also highlights the use of technology in Libya as well as technology levels and internet usage.

2.3 A View over Libya

Libya is one of Africa's largest countries. It is situated in northern Africa, bounded by the Mediterranean Sea to the north. Egypt lies to the east, Sudan to the southeast, Chad and Niger to the south, Algeria to the west and Tunisia to the northwest. The official name of Libya is the Great Socialist People's Libyan Arab Jamahiriya. Libya consists mostly of huge areas of desert and covers an area of 1,757,000 square kilometres. The population is concentrated along the coast, which stretches to 1770 kilometres (Encyclopaedia Britannica, 2007).

Libya achieved independence on December 24, 1951. A new era in the history of Libya began on September 1, 1969, when a group of young army officers overthrew the royal government and established a republic under the name of the Libyan Arab Republic. Libya's constitution, adopted in 1977, declares that the country is ruled by the people through a network of committees, and is an egalitarian, socialist state. The most important of these people's committees is the General People's Congress (GPC) and this exercises control over all government activities. Government is based strictly on the laws of Islam, the Quran and the Sharia with Colonel Qaddafi as the head of state and revolutionary leader (ArabNet, 2002) The Libyan economy depends mainly on three primary sectors: industry, services, and agriculture. The information sector has not yet been measured to determine its contribution to the total economy of the state.

The discovery of oil in 1959 has transformed Libya from a poor nation at the time of its independence to a far more prosperous one ranking 12th among all petroleum producing-countries in 2004 (ArabNet, 2002). Therefore, the Libyan economy relies mainly on the revenues from the oil sector which account for almost all of its export earnings and about 25 percent of its GDP (CIA World factbook, 2007). The petro-chemical industry, which depends on the oil sector for raw materials, has grown rapidly, with large-scale industrial complexes situated at Ras Lanuf and Bu Kammash. Oil now provides the government with its main source of revenue and constitutes 99% of Libya's exports (ArabNet, 2002) Agriculture output is, however, limited by the climate and soil therefore Libya still imports about 75% percent of its food despite the government's encouragement and endeavours to establish very large-scale agricultural projects to satisfy local consumption.

The Libyan peoples suffered for a long time from United Nations sanctions and the embargo which was imposed against the country because of the Pan Am 103 disaster and Lockerbie trial.

In addition the US has banned the importation of Libyan oil into the US since March 1982 and imposed very strict laws on commodities exchange with Libya. In 1986 economic sanctions were employed against Libya by the US Government that generally prevent US persons and organisations from any financial transactions involving Libya, including:

- The export to Libya of all goods, services, or modern technology.
- The import of goods or services of Libyan origin.
- Engaging in any type of contract in support of an industrial, business-related, or government project in Libya; and
- Dealing in any possessions in which the Government of Libya has any interest (J.M.Twati, 2006)

The Security Council suspended (but did not lift) the sanctions against Libya in April 1999. In August 2003 London and Washington began to push the Security Council to lift all UN sanctions against Tripoli as permanent members with veto power. On September 13 2003 the Security Council ended its sanctions against Libya. Consequently, Libya adopted economic reforms and announced in December 2003 that it was abandoning its plan to build weapons of mass destruction. Libya is embarking now to transform its socialist-oriented economy to a more market-based economy, through applying for World Trade Organisation membership and by implementing a privatisation strategy (CIA World Factbook, 2007).

Libya is witnessing great strides in human development after lifting UN sanctions. This can be clearly observed in the educational sector, the health sector, improvements in the quality of life, and women's participation in society. The Libyan government aspires and seeks in the near future to achieve the followings goals which lie within the boundaries of the development plan. They are:

- Diversifying the national economy and its structure in order to guarantee the sustainability element in the developmental process.
- Creating new national products and revenues as alternatives for oil which is not a renewable source and is subject to exhaustion.
- Bringing about more equality in the distribution of income.
- Maintaining and sustaining current standards of living and then developing and improving them continuously.

- Investing in the area of human capital and establishing skills and scientific capability and providing educational, training, and qualifying programmes for the labour force.
- Establishing the infrastructures, since they constitute the foundation for developing the national economy and rendering it efficient.
- Conducting a constant evaluation and follow up in order to achieve human development in accordance with international standards and national particularities (El-Hawat, 2006)

2.3.1 Technology in Libya

United Nations sanctions, which lasted for eleven years, have had a negative impact on the progress of information technology in Libya as many organisations were deprived from improving their capabilities and participation in the information age. This in its turn has reflected badly on the performance of these institutions and organisations and their efficiency and effectiveness in terms of playing their role in the advancement of society. It has been noted by economic scientists over the last few decades that radical changes have been made in the economic and political powers because of depending on technology, which includes new commodities and services that mainly rely on information as an investment source, a strategic good, and a national income source. Perhaps the most important aspects of contemporary society are the change from an industrial economy to an information economy, the change from national economies to global economies, and the shift from reliance on producing goods and manufacturing commodities to producing information.

In light of the above Libya needs to develop its ICT infrastructure and to focus on the application of IT in the agriculture, industry, and service sectors in order to achieve greater efficiency and effectiveness (Jason Derrick, 2003). In doing so Libya will be able to participate in the current information revolution which will reflect positively on the total economy of the state as many enterprises will be able to operate and compete on a global level, launch new products, and market their products and services. This should reflect itself in terms of improvements in standards of living, health, and educational sectors. At present, the use of technology in Libya is at an early stage as with most developing countries. “It is in need of an enabling framework of standards, policies, data, and procedures that is needed to support the effective coordination and dissemination of essential societal information” (SDI/ Africa newsletter, 2006). The development of a Libyan information infrastructure (LII) is being carried

out through a systematic, practical process that will establish a strategic and evolving framework for a long term LII, which provides coordination and support to the development of its various components through a carefully conceived and guided incremental process. The General Authority for Information and Telecommunications is sponsoring this initiative in Libya (SDI/ Africa newsletter, 2006).

2.3.2 Technology Levels and Internet Usage in Libya

The Internet market in Libya has increased over the last decade but not at the rates seen elsewhere in the regions. This can be observed from Internet usage statistics for Africa. Table 2.1 (Internet World Stats, 2008) shows the North Africa region, estimated populations, the number of Internet users in the region in 2008, the percentage of growth in Internet usage between 2000 and 2008, the percentage of population penetration and the total percentage of users in the country. It can be clearly seen that Libya has had the second lowest penetration and user rate in the region in 2000. The table demonstrates that the number of users in 2000 was 10,000 users, which increased dramatically to reach 260,000 users in March 2008. This indicates that there is a considerable change in the development of the Internet and its technology infrastructure in Libya that will influence the forthcoming strategies and policies concerning the adoption of ICT.

Table 2.1: Internet World Stats (2008)

Internet Usage Statistics For Africa						
Countries	*Population 2008*	*Internet user/Dec*	*Internet users – latest*	*100% population*	*100% users in Africa*	*Use growth 2000-2008*
Algeria	33,506,567	50,000	1,920,000	5.7 %	5.9 %	3,740.0 %
Egypt	72,478,498	450,000	5,000,000	6.9 %	15.3 %	1,011.1%
Libya	6,293,910	10,000	260,000	4.2%	0.6 %	1,950.0 %
Morocco	30,534,870	100,000	4,600,000	15.1 %	14.0 %	4,500.0 %
Mauritania	2,959,592	5,000	14,000	0.5 %	0.0%	180.0 %

With regard to modern telecommunications infrastructure, which is essential for the adoption of information technology, only one company was operating in the country until 1999. This company was the regulator and operator of all communications services in the country. It was established under the Ministry of Transportation and Telecommunication, which was changed later to the General People's Committee for Telecommunications. The General Post and

Telecommunication Company is still operating and has a leading role to play in the future. However, competition is required to encourage development. Therefore, the establishment of a new telecommunications firm was essential for the country. In 2000, a new company was established in order to provide efficient services in Libya. The new firm is called Libya Telecom and Technology (LTT) and provides the following services: (Libya Telecom and Technology, 2007)

- Internet Access Solutions
  - Dial-up Internet Access
  - Libya DSL
  - Broadband Internet Access over XDSL
  - Broadband Internet Access over Wireless
  - Satellite (DVB-RCS) Access
- Data network connection Solutions
  - Data Network via Wireless
  - Data Network via XDSL
  - Data Network via VSAT
- Communication Solutions
  - VSAT
  - Microwave
  - GSM
- Value-Added Services
  - Web hosting and Mail Services
  - Network Security Service
- Consultation Services
  - Technologies & Communication

This indicates that the information and communication infrastructure in Libya is steadily progressing. It is also worth mentioning in this context that the number of mobile phones has increased dramatically in the past three years. The number has risen from 24,000 with limited access and coverage in 1996 to around 5,500,000 subscribers in 2008 with almost full coverage and access in addition to 3G services, which became operational in the beginning of 2007 through the Libyana and Al-Madar Mobile phone networks.

2.3.3 Special Libraries in Libya

Special libraries are located in Libya with private corporations, business institutes, industries, scientific associations, research institutes of various affiliations, government departments etc. The first special library emerged in Libya in 1950 and since then the number of special libraries has increased as shown in table 2.2, which shows the number of special libraries in terms of dates of incorporation during the period 1950 to 2007.

Table 2.2: Number of special libraries and information centres in Libya 1950 - 2007

Period	Number of libraries	Percent
1950 - 1959	10	6%
1960 -1969	7	4%
1970 - 1979	24	14%
1980 -1989	50	30%
1990 - 1993	7	4%
1994 -2007	71	42%
Total	169	100%

The above table demonstrates that the concept of the special library in Libya has experienced limited recognition and application particularly when compared with developed countries. In general, special libraries in Libya offer their services specifically to the staff of the parent body. However, a number of special libraries provide various services to external users and some also make their services available to the general public.

This section has highlighted the current ICT infarstrutcure, technology levels and Internet usage in Libya. It is obvious that Libya needs to develop its ICT infrastructure and to focus on the applications of IT in the three main economy sectors in order to achieve greater efficiency and effectiveness. The following section will comprise an overview of some special libraries in the Arab world. It captures the current state of some special libraries in the Arab regions in terms of using and adopting of IT applications. The intention of writing this section is to obtain a clearer view of some special libraries in the Arab world to assist in understanding where special libraries in Libya are located compared to other special libraries in the Arab regions in terms of user services and applying of IT applications.

2.4 General Picture of Special Libraries in the Arab World

There are four sub-regions of the Arab world which differ mainly in terms of wealth and size but which share common characteristics such as religion, customs and values, history, and language. These sub-regions are as follows (Aladwani, 2003):

1. Arab North-African countries (Algeria, Egypt, Libya, Morocco, Mauritania, and Tunisia)
2. Arab East-African countries (Comoro Islands, Djibouti, Somalia, Sudan, and Yemen)
3. Arab heartland (Jordan, Lebanon, Palestine, Syria, and Iraq) and finally
4. Arab Gulf countries (Kuwait, Saudi Arabia, United Arab Emirates, Bahrain, Qatar, and Oman)

Because of the difficulty of covering what has been written on the topic in every country, only the status of IT in some countries in different regions was reviewed. Special libraries in the Arab world were divided into different regions, and then a number of special libraries in different countries in each region were selected for review according to the avalibality of resources.

Syria started providing electronic mail in early 1999.The project was aimed at providing e-mail as well as internet services via FTP. Two types of subscription were offered, one for e-mail and another one for browsing the internet (Askhita, 2000). Different problems and obstacles were encountered at the beginning of the project but were overcome later on. In 1998 the Al-Assad National Library put its national databases on the National Data Communications Network Syria Pac and allowed access over the network to users from all over the country (Askhita, 2000).

Saudi Arabia started using computers in the late 1970s (Ramzan, 2004). Libraries in Bahrain implemented electronic checking systems for books and started using CD- Rom databases in late 1980. Automation of library operations in Saudi Arabia began in the 1980s. This included integrated library systems and the use of on- line databases. Internet and networking followed in special libraries and academic libraries in the early 1990s (Ramzan, 2004).

A recent study of Jordanian libraries (Younis, 2002) revealed that libraries in Jordan and in particular special libraries use either integrated Arabised information systems, such as the MINISIS and CDS/ISIS software packages, or a customised system. Aladwani (2003) states that there is considerable difference in terms of number of hosts per 1,000 people across regions: “The Arab Gulf region once more dominates the top rankings. On average, there are approximately 1.5 hosts per 1,000 people in the six countries compared to an average of 0.05 hosts per 1,000 people in the remaining Arab countries. Not surprisingly, the Sudan, Djibouti,

and Yemen sub-regions have the least number of hosts among all sub-regions of the Arab world with 0.02 hosts per 1,000 inhabitants. In terms of the absolute number of Internet hosts, United Arab Emirates comes first with more than 34,000 hosts and Djibouti comes last with only one Internet host".

It would seem that special libraries in the Arab world have more similarities rather than differences as there are no significant differences between special libraries and information centres in most of Arab countries in terms of services presented to end users. However, ICT usage differs from one special library to another according to existing circumstances such as financial support, levels of education and awareness of library managers, the direction and support of the parent institutions, and the awareness of the importance of ICT in different regions. In order to get a clearer view of the current state of special libraries in the Arab world a number of studies that have been conducted in those countries to shed light on special library services in certain Arab states were reviewed in order to establish the level of those institutions with regard to the services provided to end users and to shed light on how IT influences the improvement and development of the services offered.

In a PhD study covering special law libraries in Egypt (Mohammed, 2004) the researcher discussed the status of nine law libraries and information centres. The study was aimed at evaluating the services provided by law libraries along with technical services. Technical services in this context means, the job that is usually done behind the scenes with materials and/or systems such as classifying and organising materials and describing and indexing resources. The results of the study revealed that law libraries in Egypt were in poor condition as the basic components of law libraries such as buildings, equipments, resources, and staff were not up to the level, which prevented those libraries from being able to serve end users. The researcher found it necessary to follow the recommendations made by the study to improve the services provided by law libraries in Egypt. Amongst the most important recommendations were:

- There is an urgent need to develop ICT strategy along with ICT infrastructure.
- Library collections were found to be inadequate in terms of quantity and quality. Therefore, there is a need to develop an appropriate policy for acquisitions in law libraries.
- Law library staff were not found to be in a position to provide adequate services to users because of a lack of the skills required and an inability to understand the needs and requirements of users served by law libraries.

Another study was conducted in the same country into the pharmaceutical sector (Amar, 2000).This study focused on the status of information services in pharmaceutical information centres in Egypt through a field study of a sample of medical information centres in thirteen specialised libraries.

The study covered several pharmaceutical information centres that provided services to end users. It discussed current awareness services, selective dissemination of information services, indexing and abstracting services, translation services, bibliographic services and user training. Some of the study findings were as follows:

- Most of the libraries and information centres in the selected sample were not able to provide translation services and the level of selective dissemination of information services was very weak.
- There is a notable lack of a plan or policy to guide workers about better ways of providing information services using appropriate methods.
- There is a lack of the necessary financial resources to provide required services in addition to a lack of cooperative programmes between libraries and information centres of medicine.

The study recommended a number of steps to improve the condition of libraries covered by this sector. The most important of these were:

- There is a need to provide adequate financial resources to cover the cost of information services.
- There is a need to speed up the provision of current awareness service and selective dissemination of information services through finding suitable ways to provide these types of services.
- There is a need to speed up the creation of a cooperative action plan between libraries and pharmaceutical information centres for the delivery of high efficiency services.

Libraries in the Gulf region, which comprises the six states of Bahrain, Kuwait, Oman, Saudi Arabia, Qatar, and the United Arab Emirates (UAE), started using the first generation of library automation systems such as MINSIS and DOBIS /LIBIS in the 1988s (Khurshid, 2003). These systems were Arabised to handle Arabic script. In 1990, many other systems were implemented and used in academic and special libraries in this region, such as AMICUS, DOBIS/LIBIS, Horizon Millennium, OLIB, Q Series, Unicorn and Virtual/VTLS. Since 1991 the Horizon system has been

implemented and used by many special libraries. According to a survey of market share of library systems in the Arabian Gulf region in December 2002, Horizon systems were found to be used by 30 special libraries from a total of 59 special libraries in that region (Khurshid, 2003).

Despite the fact that the Gulf region is a very wealthy region and was the first region to implement and use automated library systems the performance of special libraries in that region has not been good. A study was conducted to reveal the current status of the services provided to end users at the King Faisel information centre for research and Islamic studies (Almasned, 2003). The objective of the study was to determine the impact and the benefits of information services which the centre provides to end users by exploring categories of users, the nature of the most frequently required documents, and users' interests. After the researcher had assessed the present condition of this centre the researcher implemented a number of recommendations produced from the study which focused on drawing up a plan for collecting data and documents that satisfy user needs and suit the objective of the centre. He also found that there was a desperate need for preserving and maintaining existing databases with regard to subject coverage, information updating, and exploiting the latest developments in ICT. He also extended services for users such as the current awareness service and selective dissemination of information.

Another study was conducted within the same region with the aim of discovering the status of special libraries and information centres in Bahrain (Alremhy, 2003), their basic structure and any obstacles and constraints that faced these institutions. The following points summarise some of the results:

- Information centres have undertaken the first steps towards developing ICT infrastructure in order to provide users with electronic data and information in all sectors.
- Electronic catalogues will be constructed in order to be able to provide users with full bibliographic data.
- There is a lack of standards pertaining to the construction and building of special libraries and information centres in Bahrain.

The study recommended the following:

- There is a necessity to start building a national library.
- There is also a need to establish a national information bank

- Establishment of comprehensive networks to facilitate access to information and access to international networks is a fundamental issue.

Another study was conducted in 39 companies and corporates in Kuwait, which is a small state in the Arabian Gulf with the second largest petroleum reserves, to investigate the conduct of information operations in companies covered by the study (Laila Marouf ,2003). One of the most significant findings of this study was that the majority of Kuwaiti corporate companies are engaged in a number of information activities but none of these corporates had any professional who had formal education and training in information studies. It was also noted that there was little activity with respect to indexing, filing, tagging, classifying, and categorising internal information.

A number of papers have been published and various studies have been conducted in the Arab heartland region, which comprises Jordan, Lebanon, Palestine, Syria, and Iraq. A study of the use of computers in the field of information services in Iraq (Kandligy, 2000) was aimed at assessing the Iraqi experiment into the use of computers in information services. This study reviewed different types of information services and highlighted computer use in the field of information services in some Iraqi institutions.

The study focused on on-line search services and identified the types of databases used in these institutions. The study made a number of proposals related to financial support to improve the use of computers in the area of information services and documentation in scientific institutions in Iraq in order to improve the overall services. The study also revealed that there was a lack of well-qualified staff. Therefore, there is a need to draw up new strategies that include training programmes and workshops to develop staff skills. Moreover, the study highlighted a general lack of user services such as current awareness, selective dissemination of information and translation services.

2.5 Previous Studies into Special Libraries in Libya

Previous studies into special libraries and information centres in Libya are reviewed in this chapter in order to provide a clearer view of what has been explored in this domain. Several studies have investigated the status of special libraries in Libya at various periods. The studies have covered various special libraries and information centres in diverse places and cities in different sectors. A review of these studies has contributed to obtaining a comprehensive image of what needs to be explored and what needs to be reinvestigated in order to handle existing problems and to improve the current state of special libraries in Libya.

It is worth noting in this context that studies carried out to develop special libraries in Libya did not pay adequate attention to approaches that could be implemented to improve these institutions in line with current trends or what steps should be taken towards the improvement of information services for special library users in Libya. Most previous studies have focused on basic and general components of special libraries and did not try to find ways for improvements or put in practice practical solutions such as building subject gateways or digital libraries to satisfy the diverse needs and requirements of users. The studies conducted in this domain have been arranged chronologically.

(Mabrok, 2004) studied the current status of the sectoral information and documentation centre belonging to the Secretariat of Housing and Utilities in Benghazi city. The study focused on technical services and services provided by this centre to research workers, managers, users, and decision makers.

In order to identify the status of the centre, and to discuss the situation from different aspects, the study relied on a survey approach using various tools and instruments to collect the necessary data about the centre. These tools included questionnaires, observation, personal interviews, field visits and actual reading of available intellectual output.

The research findings were as follows:

- Most of information and documentation centres in Libya, including this sectoral information and documentation centre were in initial and early stage.
- The centre had no independent budget and the Secretariat of Housing and Utilities-of Benghazi paid the salaries of employees.
- There was a lack of documented policy to organise the centre's activities.

- Specialised services were not provided at this centre. This led accordingly to lack of specialised reference material to assist both executives and researchers.
- There was a shortage of qualified staff in the field of library and information science resulting in serious problems for the current staff.
- There was no cooperation between this centre and corresponding centres inside and outside the country.
- There was a lack of training and qualifying programmes in the field of library and information science, although more attention had been taken for computer training programmes.

The study suggested a number of recommendations the most important of which were:

- Drawing the attention of decision makers and executives to the importance of information and documentations centres in Libya would impact positively on the public view towards the centre and encourage qualified librarians to join the centre.
- There is a need to improve the administrative, technical, and organisational elements of the centre according to the scientific principles in the field.
- Lack of a documented policy and scientific standard to be used by the centre for the performance of its services affected negatively the performance level rate.
- More attention should be paid to archiving methods for storage and maintenance of documents for longer period.
- It is necessary for the centre to have its own independent budget.
- It is necessary to provide advanced information services within the centre. These include selective dissemination of information and on-line search services. Attention should be paid to evaluating these services periodically by the centre employees and users.

Another study (Hasan, 2003) was focused on information services in medical institutes in Tripoli-Libya. It concentrated on the availability of several information services in some specialised libraries in order to get a clearer view of the services provided to end users during the period 2002 – 2003. A random sample of libraries was selected to represent the sector of health. The study arrived at the following results:

- The standards of the services was very low.
- Various information services such as current awareness service and SDI service, which are supposed to be provided to library clients, were found to be very weak.

- There was a lack of necessary financial support to provide required services in addition to a lack of cooperative programmes between libraries and information centres in the health sector.

The study concluded with recommendations, of which the most important were:

- Qualified specialised librarians should be encouraged and enabled to run these institutions in order to solve the problems and difficulties facing these libraries.
- Drawing up a consistent policy for developing information service is essential in order to improve services presented to users.

The main function of information services is to find the means that assist library users to access sources of information relevant to their requirements and needs in an efficient way. Therefore, exploring the service levels in special libraries and information centres in corporate companies in Libya was essential in order to discover their weakness and strength. Another study by Naser Edden, (2003) focused on the level of information services of corporate libraries and information centres in Tripoli and suggested that: "The success of offering various services reflects the success of the library in performing its functions and duties". Based on this view the study focused on the availability of information services in a number of corporate libraries chosen from a random sample to represent information centres in corporate companies in Tripoli. It explored some important services such as lending services, indexing and abstracting services, current awareness services, and selective dissemination of information services. The study has arrived at the following results:

- The level of information services already provided in corporate libraries and information centres was less than average.
- Information services were in dire need of managerial development to raise the level of performance management.
- Financial support for these institutions was not adequate. This caused many constraints in terms of purchasing the library resources and materials needed to satisfy user requirements.
- There was lack of some essential services such as online search services, bibliographic services, current awareness services, and selective dissemination of information services.
- There was a lack of qualified staff in addition to a lack of training programmes.

The study concluded with some recommendations of which the most important were:

- The design of legal libraries should be according to the latest standards and specifications in the field of library science.
- There is a need to draw up an acquisition policy.
- Establishment and creation of databases is essential for designing an integrated information system in order to improve information services.
- There is a need to reconsider the current state of libraries' holdings to suit the increased number of users in addition to developing strategies that ensure the success of selecting library materials.

This section has explored previous studies into special libraries in Libya in order to provide a clearer view of what has been explored. A couple of studies have been reviewed to obtaining a comprehensive image of what needs to be reinvestigated in order to handle existing problesm. Almost all previously mentioned studies which were conducted to reveal the status of special libraries in particular sectors in Libya have pointed that the services provided through these libraries still weak and undeveloped due to various problems and barriers.

The following section aims at exploring the impact of information technology on library services in general and special libraries in particular. It shed light on the influence of IT and the Internet on special libraries and reviews the services that supposed to be provided in the new electronic environment. It also provides a comprehensive image of the impact of integrated systems on special library services and highlights free integrated software packages that can be used to enhance the services provided to end users such as CDS/ISIS and GENISIS.

2.6 The Impact of Information Technology on Library Services

During the twentieth century, all types of libraries dealt with printed information sources particularly books and periodicals. Audio-visual materials have been part of library collections since the 1930s and then came the magnetic disk to store machine-readable information in the 1960s with the entry of computers to libraries. Subsequently CD-ROMs of all kinds and forms / Multimedia CD / DVD, which spread during the 1980s and 1990s, have become also part of library collections. All of these materials have presented challenges for libraries and librarians particularly with regard to indexing, cataloguing and classification. Nevertheless, libraries and librarians managed to overcome these hindrances and managed to deal with them step by step by adopting and using technology and by appointment of well- qualified and skilled staff. The evolution of electronic publications and the ability to print Full text, Images and the techniques of hypertext coupled with the development of research methods and strategies for searching full text in a remarkable way resulted in achieving flexible and effective search.

The advent of the internet and World Wide Web has also brought not only a dramatic change in library sources and materials but has also changed the way of providing library services and meeting user expectations. Library patrons nowadays expect the following (Moyo, 2004):

- Faster service
- Service availability
- Easy access
- Virtual reference service librarian available online 24/7
- Easy-to-use Web resources permitting self-service
- A librarian who knows all subjects and all databases
- Everything should be in electronic format
- Several alternatives to choose from
- Ability to conduct all library transactions online (e.g. library registration, requests for document delivery and interlibrary loan, renewal of library items, etc.)
- A Web site search engine that can find what they want; and
- Everything in full-text and downloadable or printable

This shift in user requirements and needs in the new electronic environment has obliged libraries of all types to develop IT infrastructure to cope with user demands. Kebede (2002)

states that library users prefer convenient, easy-to-use information media and technology that is easily available and requiring skills that they already possess. The reason for these new requirements and demands may be related to positive experiences with new technology which has offered time saving in information search and delivery. In addition to enlargement of the scope of resources used regardless of negative consequences that are associated with information overflow and problems in using new services due to the lack of skills required to get the utmost benefits of electronic services (IFLA proceedings, 2005).

Kasarab (2006) confirms these user expectations. He points out that we live in a world where speedy delivery is essential as a consequence of the internet and electronic sources, which have created expectations amongst users that everything can be found electronically. Library customers cannot always understand that not everything exists in electronic form or can be available in electronic form. Therefore, librarians will have to give access to more electronic resources in order to satisfy the growing demands for digital materials. The impact of the recent expectations of library readers on information professionals and librarians has massively changed the way they perform their job and put them under continuing pressure. In the light of this fact they have to improve their professional skills and to keep up to date with advanced tools to be able to cover the growing demand of electronic information. Marshall (2003) embodied these new challenges in what she refers to as the three-paradigm shift:

The first shift is the transition from paper to electronic media as the dominant form of information storage and retrieval. Linked to this transition is the convergence of previously separate media, such as text, graphics, and sound, into multimedia resources.

The second shift relates to the increasing demand for accountability, including a focus on customers, performance measurement, benchmarking, and continuous improvement. All of this is taking place in an era when the financial resources available for providing library and information services are shrinking.

The third shift comes from new forms of work organisation such as end-user computing, work teams, job sharing, outsourcing, downsizing, and re-engineering.

2.7 Information Services in the Electronic Environment

Despite previously mentioned challenges there is no doubt that any new development in the form of containers and sources of information has advantages and benefits to both the library and users. We have seen the effects of rapid technological developments over the past two decades, which have affected most of the activities of library procedures, and the nature of services provided to library patrons and the way services are provided to users. Electronic journals for example which can be considered as a major development in the field of electronic publishing have had a positive impact on library users. An increasing number of e-journals are now available as online open access, requiring no subscription. Commercial journals are also available online as subscription-based. Electronic journals assisted libraries and users in many ways. The following is a summary of the advantages and benefits of electronic journals and their impact on libraries in general and special libraries in particular (Ashcroft, 1999):

- Electronic journals help libraries to be rid of the problem of theft of periodical' pages and the problem of storage associated with paper versions.
- Electronic journals help libraries to reduce expenditure associated with the purchase of furniture for shelving and keeping the old volumes.
- E-journals help libraries to reduce expenditure required for binding, repair and maintenance.
- E-journals help many libraries to reduce the problem of tracing articles required by patrons and the problem of loss and late arrival of some issues and so on. In fact, there is no longer a need to wait for days or weeks in order to obtain the required articles from a magazine or a journal.

In terms of user advantages, E-journals have helped library patrons in many ways .The fol lowing are some of the user benefits:

- Users are offered direct, permanent access, and constant access 24 hours a day, 7 days a week. It has become possible for users to satisfy their research need without being restricted to the opening hours of the library.
- Multi-user access, where the same article and research papers can be accessed at the same time; this was and still is difficult with paper-based forms.

- Fast access, many electronic journals are available on the web a week or two before the emergence of the printed version.
- Flexibility in the way of accessing the articles or research papers: either printing them directly (access to a hard copy) or downloading them or e-mailing them as file attachments. This method resolved the problem of users having to create photocopies of a paper as most libraries do not circulate their journal collections and do not allow issues outside their premises(Cargille, 1999).

Enabling technology has contributed to the transformation of library services from traditional services that depend on card catalogues, traditional sources, and face-to-face reference services to new revolutionary services that include electronic sources, virtual services and on line services. The pace of technology innovation in libraries has steadily accelerated over the past decade to make work more efficient. Neil McLean, the librarian of Macquarie University, stated in a keynote address to a UK/Australian seminar on cooperation in London in July 1997 that the new service paradigms will include the following (as quoted by Moyo, 2004):

- The capacity to influence both the form and makeup of information consumed.
- The personalisation of information/communication services.
- Location should not be a distinctive barrier to access.
- Transparent access is expected to a range of information resources.
- The ability to access a number of remote information sources at the (same) time.
- The ability to mix different media in real time.
- The provision of a choice in suppliers; and
- The ability to interact with other colleagues in a collaborative-networked environment.

Virtual references services (VRS) have massively changed the way of providing reference services to library users. However, the traditional service is the basis of the latter, and the latter is the inheritance and development of the former. Because of the advantages associated with VRS almost all libraries which have the ability to shift to electronic services that need a solid base in technology infrastructure have moved to the electronic environment and begun to provide VRS in the beginning of the new millennium. Moyo (2004) suggests that virtual reference services offer the following advantages:

- Service is easily accessible wherever there is Internet access.
- Capability to reach both remote and local library users.

- Increases accessibility of librarians to library users.
- Provides point-of-need assistance to users and;
- Convenient for those users who cannot otherwise come to the library (e.g. mobility impaired, invalids, etc.)

2.8 The Impact of Integrated Systems on Special Library Services

An integrated library system was defined by Saffady (2000) as an interrelated suite of computer programs that automates multiple library operations. Automated library systems have been in use for more than two decades (Farajpahlou, 1999). Future developments are expected in technical service functions following the same trends, as well as changes that will provide ways to manage emerging electronic products (Bills, 2000). By 1992 more than 1,300 large integrated library systems had been installed in the EC (European Community) member countries (Larsen, 1992). Special libraries across the world have implemented integrated library systems over a long period to improve their technical services, as the effects of such systems can be significant and benefits are well documented. Ebenezer (2002) summarised the advantages and impacts of integrated systems on technical services as follows:

- Improving the efficiency of internal operations, through improving internal workflow and sharing catalogue data.
- providing access to local library resources, through the provision of OPACs and through retrospective conversion of card catalogues and;
- Providing access to resources outside the library.

In the Gulf region, some libraries have introduced only CD-ROM and online literature searching. Others are in the process of planning the implementation of automated systems and the integration of electronic information sources into their services (Ashoor, 2000). Over the last two decades, a number of special libraries and information centres in the Arab world have introduced electronic resources into their library services. Very few have implemented automated and integrated systems. By implementing integrated library systems, special libraries would be capable of enhancing their technical services to the required standard and would be able to provide services that are most frequently required by end users.

The United Nations has supported a number of different approaches to assist developing countries to leapfrog to the rank of developed nations by adopting some programs that can help in achieving the targeted goals. This was addressed in the Geneva Declaration of Principles

and Tunis Commitment **(**World Summit on the Information Society. 2005**)** The recommendations of both summits emphasise the following;

- Adoption of Information and Telecommunication technologies, which are considered the corner stone required for supporting the process of the transition to an information society.
- Developing human capacity by designing of training programs and workshops in order to improve information literacy.
- Establishment of national information policies to enhance the current state of information infrastructure.
- Establishment of digital content and long-term preservation strategies of the information created, purchased, and harvested in a digital form.

There are various free integrated systems supported by the UNESCO such as WEBLIS and GENISIS that can be used and exploited by special libraries and information centres to develop the services presented to end users. WEBLIS is a free-of-charge Web based Library Integrated System based on CDS/ISIS. This software consists of the following modules:

Cataloguing system

OPAC search

LOAN module

Statistical module

GENISIS is also a free of charge system. There are two versions of the tool: GENISIS Web, for web publishing and GENISIS CD for developing CD Rom interfaces for CDS/ISIS databases.

In addition to these software packages there are many other freely available software that can assist in developing technical services in special libraries such as CDS/ISIS, MINSIS, and DOBIS/LIBIS.

Regarding the Arabisation of library systems, automated library systems in the Middle East have gained a foothold mainly through local initiatives involving conversion of two western products: DOBIS/LIBIS and MINISIS. Collier (2002) states that the Arab market is however receiving considerable attention from many commercial suppliers who claim that their products are readily convertible to Arabic.

The advent of the Internet has not only developed library services but also has contributed to the design of new tools such as the Intranet, which have made real and noteworthy changes in the provision of library services. The industrial and technological revolution has had an effect on the creation of specialised libraries in the present century in order to satisfy a great variety

of research needs through the services provided by these information centres (Garcia, 1997). Digital libraries, which have emerged as a result of the evolution of technical technology, have dramatically changed the way users search and obtain information in flexible ways all over the world. This considerable change will lead to the library of the future and will dominate the future of online searching. Digital libraries will offer a much richer set of services to their users than the traditional library and a large variety of multimedia text, images, and audio-video materials to satisfy user requirements and demands.

2.9 Digital Libraries

There are many different views in the literature as to the actual nature of digital libraries. This thesis does not intend to provide a comprehensive collection of definitions of the digital library, but rather a number of representative definitions. A variety of terms are still used interchangeably such as electronic library, hybrid library, library without walls, cyber library, virtual library etc. Arms (2000) views a digital library as “managed collection of information with associated services, where the information is stored in digital formats and accessible over a network”. Witten and Bainbridge (2003) define the digital library as “a focused collection of digital objects, including text, video, and audio along with methods for access and retrieval, and for selection, organisation and maintenance of the collection”. The digital library federation (DLF) defines digital libraries as “organisations that provide the resources, including the specialised staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities." A digital library has the following characteristics (Jeng, 2006):

- It is an organised and managed collection of digital objects
- It is accessible over internet or server
- It is a global information infrastructure
- Should over service

The last point indicates that there is a difference between a digital collection and a digital library in that a digital library should offer service to end users. Therefore, a digital library is considered a collection of information objects and a collection of services that should be

provided by the digital library. “The definition of a digital library that came up in the March 1994 Digital Library Workshop emphasised that a full service digital library must accomplish all the essential services of traditional libraries and also exploit the known - well advantages of digital searching, storage, and communication (Chowdhury, 2002).

Leiner (2009) reports “There are a large and varied set of services, including services to support management of collections, services to provide replicated and reliable storage, services to aid in query formulation and execution, services to assist in name resolution and location, etc.”

The World summit of information society in Geneva 2003 and Tunis commitment 2005 declare the desire to build a people-centred and development-oriented information society, where everyone can create, access, utilise, and share information and knowledge (World summit on the information society, 2005). An information society is defined as “a type of society in which information and information access plays a central role, economically, socially and individually. (Mobileman Glossary,2005). The information society can be measured by exploring citizens access to and use of the internet, e-government, e-learning, e-health, buying and selling on-line and e-business readiness. It may be concluded from the former definitions that everyone in an information society participates in the process of handling of information as a producer or as a consumer and access to information is also available to everyone. Digital libraries can assist in narrowing the digital divide which is still widening between developed countries and the third World countries. The term digital divide was coined in the 1990s to describe the growing gap between those who have access to, and the skills to use, ICT and those who have limited or no access. In other words, it is the gap between the haves and have nots, or the information rich and the information poor. Digital libraries can assist in the transition process to an information society in many ways. Establishment of digital content and long-term preservation strategies of the information created, purchased, and harvested in a digital form along with an ICT policy framework, to highlight the priorities of providing information for health and education as well as for remote specialists and researchers, is considered a major step for the advancement of developing countries. Meyyappan (2000) reports that “reviews of digital libraries show the diversified collection of information resources available to users ranging from full-texts of journal and conference papers to CD-ROM databases, theses and dissertations, e-journals, e-books, examination papers, images and photographs, maps, audio, video and multimedia resources, manuscripts and so on”. This means that the World is witnessing a considerable transformation from print based-formats to electronic-based formats and almost all known

formats can be stored and retrieved from digital libraries which can be accessed in a variety of ways, for example through:

- Institution's library WebPages
- WebPages of specific digital libraries such as NDLTD, NCSTRL, NZDL, ACM digital library, Pub Med
- Subject Gateways, such as SOSIG, Biz/ed, OMNI
- Search service providers such as Dialog, Ovid online, Proquest
- Web search tools: search engines including meta search engines and speciality search engines like Google, AskJeeves, Kartoo, Vivisimo, etc., and directories like Yahoo (Chowdhury ,2000).

Digital libraries improve the spread and access to information in many ways. Pandian (2001) points to the following advantages:

- Digital libraries bring the library to the user
- Searching and browsing
- Support full text searching
- Information can be shared more easily
- Current Information can be updated easily
- Information is always available (not limited to space and time)
- New forms of information become possible (digital representation of objects)
- Allows networking and exchange of ideas
- Preservation and archiving
- Faster scholarly communication and research
- Multilingual capability

Other advantages of digital libraries as mentioned by Haddouti (2007) are:

- Users can access the information everywhere
- Reduction of bureaucracy by access to the information
- The information is not necessarily located in same place
- Understanding the catalogue structure is not necessary
- Cross references to other documents speed up the work of users
- Full text search

- Wide exploration and exploitation of the information

Digital libraries can provide cost effective information retrieval system, provide library materials to the largest possible audience, and can simplify the process of library search, material lookup, and typical library functions (Malkawi, 2007). In the last four years, the digital library paradigm received considerable interest from scientists from various areas (universities, arts, libraries, industries, etc.). The emerging term Digital Library is the result of information proliferation and technological advances. Witten (2006) states that "digital libraries can assist human development by providing a mechanism for distributing information on priorities and materials that addresses specific community problem besides benefit from methods of information distribution".

Digital libraries are spreading over the world. All types of libraries, e.g. academic, national, public and special libraries, have started building digital libraries. The number of digital libraries on the internet is increasing dramatically. Managers of special libraries and information centres across the world have realised the importance of digital libraries and their potential contribution to the advancement of the services provided to end users and their positive effect on the performance of the parent body. A considerable number of special libraries in institutions, organisations, enterprises, and industries have built their digital collections and have started the provision of digital library services using various software. Building a low cost digital library is becoming less complicated thanks to the availability of free software required for building low cost digital library**.** A significant quantity of the software required for building digital libraries is freely available and can be modified and redistributed. This type of software is generally called open source software. Source Forge is a very famous site for downloading a variety of software required for building digital libraries. The following are some of the well-known software in this domain according to the Registry of open access repositories (ROAR)

- Greenstone
- Dspace
- Bepress
- Eprints
- Fedora
- DigiTool, etc.

A number of special libraries and information centres have built their digital collections to improve the services presented to end users and to start providing electronic services. The availability of free information resources on the Internet has encouraged many library professionals involved in building electronic collections to exploit such resources for building their digital libraries. These resources are free to use by anyone anywhere in the world. Librarians and information professionals can add what they think might be useful for their users to their local digital library. In addition, there are also government publications that could also be disseminated through the digital library. Some freely accessible resources on the net are mentioned below. Special library users can benefit from the vast amount of information through the local digital library if these resources are added to the digital library.

It is worth mentioning in this context that there are also several information resources available on the web through Subject Gateways and Virtual Libraries. Chowdhury (2004) has pointed to several subject gateways that are very useful if information professionals involved in building the local digital library choose the appropriate one and make it accessible to their users by pointing to the website from their own page.

Examples of subject gateways:

- BUBL: This subject gateway provides an organised structure of web resources using DDC.
- Business and economics.
- Social science: SOSIG.

The following screenshots show some digital libraries that were built using open source software. All of these digital libraries were built by digital library developers using Greenstone digital library software

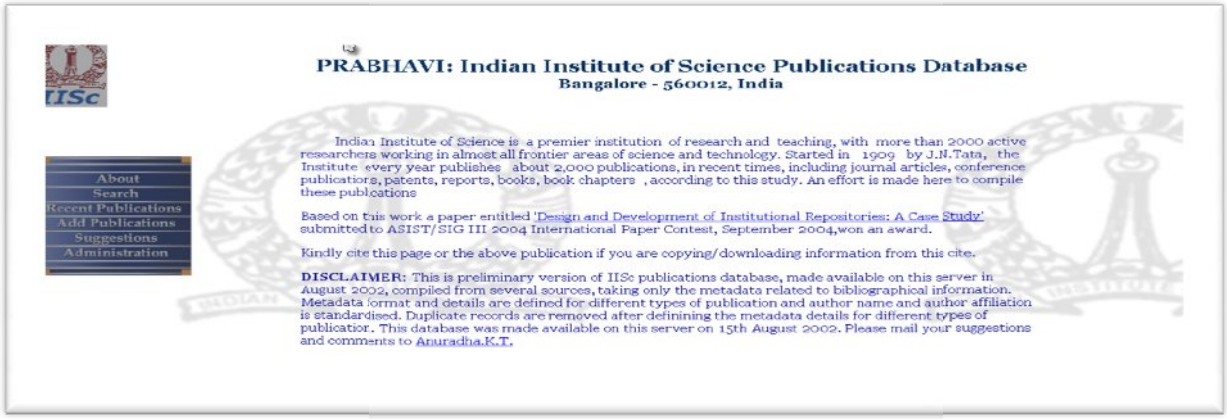


Figure 2.1 Indian institute of science publications database

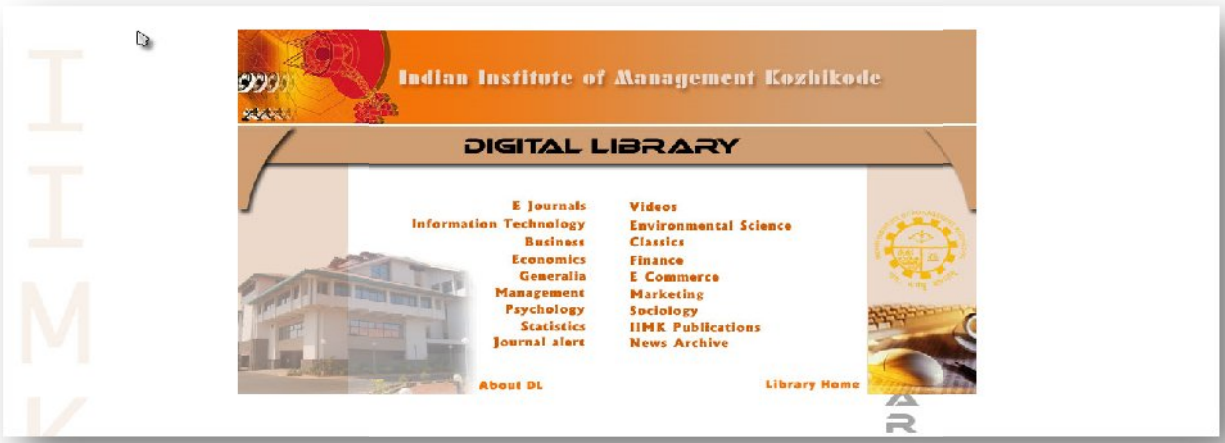


Figure 2.2 Indian institute of management

The Indian Institute of Management Kozhikode is a premier management school set up by the Government of India during 1996. The Centre for Development of Digital Libraries of IIMK uses GSDL software for its DL collection development. The DL at IIMK is truly a multi-media, multi-publication type and multi-format library with books, monographs, reports, journals, cases and educational videos forming part of its growing collection.

Very few libraries in the Arab world have exploited open source software to build digital collections and to start providing electronic library services. A handful of organisations and institutions have built digital libraries and made them accessible on the internet, e.g. Sudan open archive and the Sudanese Association of libraries and information. Both digital libraries were built by Greenstone software.

Figure 2.3 Sudanese association of libraries and information

Figure 2.4 Sudan open archive

Digital libraries can assist in developing the services provided by the special library in many ways. For example, some special libraries keep a user's profile and each user should update his or her profile, which is normally stored by the librarian and covers most of his or her informational needs. The user of the special library can be notified by email or other means of communications when materials of his or her interests are delivered to the library. It is a sort of current awareness service. The digital library can provide this sort of service electronically, which is faster than any other means of communications. The digital library also plays an important role in delivering the information required by special library users in the organisation by publishing the organisation's publications and giving access to such materials to their scientists, research workers or employees. Statistical data can also be provided through the local digital library. Reports and technical reports can also be provided through the digital library. In fact, a considerable variety of information resources of user interest could be easily provided through the library. The following are a number of information materials that can be provided through the digital library:

- e- books
- e- journals
- Statistical data
- Annual reports
- Technical reports
- Standards
- Theses
- Audio, video, and multimedia

The special library is considered an information centre for the organisation it serves and has a significant role to play for the advantage of the parent body. Therefore, a shift to an electronic environment is a necessity if the special library wants to survive in the 21st century in which a new generation regarded as digital natives have grown up. Prensky has developed this new concept to describe individuals who have grown up in an entirely internet world (Law, 200).

2.10 Summary

This chapter has begun with a review of definitions of special libraries followed by an overview of Libya. This is followed by a general overview of special libraries in the Arab regions and a review of the impact of ITon special library services. The last part of the literature review looked at definitions of a digital library which, like those of special libraries, vary considerably.

The first section highlighted the definitions of the special library and the type of services provided by this type of libraries. It also clarified how these services differ from what other types of libraries provide. The second section shed light on the location of Libya, where the country is situated in Africa and the population of the country. This is followed by the third section which highlighted the use of technology in Libya as well as technology levels and internet usage. The section followed indicates the current status of special libraries in some regions of the Arab world in order to obtain a clearer view of the level of the services provided to target users to assist in understanding where special libraries in Libya are located compared to other special libraries in the Arab regions in terms of user services and implementing of IT applications. This chapter has showed that IT has influenced special libraries in a positive way. Today's technology and currently available IT applications such as integrated library systems , reposetories, and digital libraries play a vital role in enhancing the services provided to end users. Therefore, special libraries should adopt and implement these technologies in order to meet the changing needs of the users. This chapter has also highlighted some freely avaliable open source software that can assist special libraries, especially those in developing countries, in improving their services without having to spend their budgets on commercial systems.

The following chapter presents the research methodology employed for this study. It highlights the methods employed to conduct the survey and the approach used for gathering the data required for this research. It attempts also to shed light on the tools used for gathering the required data by using three different questionnaires distributed to a sample set of selected libraries and a sample of special library users in Libya.

CHAPTER 3: RESEARCH METHODOLOGY

This chapter presents a detailed description of the research design and methodology used in this study. It describes the various stages followed in this research and provides justification for the appropriateness of the methodology used, the suitability of data collection instruments and the rigour of checks and balances applied throughout the research.

3.1 Introduction

The word methodology refers to "a system of methods and principles for doing something" (Cobuild, 1987). A methodology assumes that there is a logical order the researcher needs to follow in order to achieve a certain predetermined result (e.g., knowledge, insight, design, intervention, change). Defining and defending the logic of this order is what methodology is all about. According to Colton and Covert (2007) "methodology refers to how we will go about understanding the phenomenon or question of interest and addresses the approaches used to collect, analyse, and interpret information". Gay and Diehl (1992) state that research method refers to the overall strategy followed in collecting and analysing data; this strategy is also referred to as research design.

O'Leary (2004) concludes that research method is the set of techniques used to collect data, i.e. interviewing, surveying, and observation. The process of carrying out primary research can be seen as involving a number of stages, including: formulate research questions, select a research design, choose an appropriate method, administer the method to collect data, analyse the data, and interpret the results in relation to the original research questions. Emphasis on any one of these stages can vary depending on the type of research strategy and methods being adopted.

A distinction can be made between research methods and research methodology. According to Kothari (2004) research methods are those methods/techniques that the researchers use to conduct their research and perform specific research operations. In other words, all those methods which are used by the researcher during the course of studying his research problem are termed as research methods. Research methodology on the other hand is a way to solve the research problem systematically and can be seen as the strategy, framework and associated plans which drive the selection of specific methods. It is necessary therefore that researchers need to know which of these methods or techniques are relevant, and which are

not, and indicate why. Researchers also need to understand the assumptions underlying various techniques and they need to know the criteria by which they can decide whether or not certain techniques and procedures will be applicable to certain problems.

As regards types of research methods there are two broad categories: qualitative and quantitative. Qualitative methods involve "open-ended explorations of people's words, thoughts, actions, and intentions" as a means of obtaining information (Judd, 1991). An interview that results in a written transcript, field notes reflecting direct observation of participants, and video-recordings are examples of qualitative approaches. Quantitative approaches typically focus on "how much, how often or how many" (Judd ,1991) and therefore often make use of data that are numerical or can be converted to numerical data, such as a questionnaire that uses a response scale numbered 1 to 5. There are also mixed method approaches which, as the term suggests, make use of both qualitative and quantitative measures.

Based on the issues and questions being investigated, which involve exploring and developing information services for special library users in Libya by adopting IT and designing a low cost digital library to enhance current services, this research has adopted a mixed research approach which incorporates qualitative and quantitative methods to explore the research objectives. The next section provides a description of the research methods employed in this research in addition to the research techniques and research instruments used to achieve the research goals.

3.2 Overview of Research Strategy

As noted above, a distinction can be made between research strategy and a research method: research strategy refers to a way of going about one's research, embodying a particular style and employing different methods, while a research method refers to a way of systemising observation, describing ways of collecting evidence and indicating the type of tools and techniques that were used during data collection (A.L.M, 1996). The research strategy that was used in this research was as follows:

1. Identification of special libraries and information centres in Libya and categorisation of them into the following sectors:

- Government departments
- Government organisations
- Financial companies.
- Energy organisations.
- Legal organisations.
- Health libraries
- Highly-specialised institutes
- Research and documentation centres

It is important to point out that definitions for libraries attached to the sectors mentioned above have been drawn from key references in the field of library sciences such as the Encyclopaedia of Library and Information Science (2005). Libraries of this type provide services to groups of users with special interests, hold resources related to these interests, deal with only a specialised or particular type of information and belong to specified organisations or institutions. Therefore, they are different from public libraries, national libraries, university libraries, and school libraries.

2. Three questionnaires were designed to collect general and basic data for the research. This assisted the researcher to derive the information necessary to achieve the research objectives described in chapter one.

3. Data for this research was gathered from selected special libraries through personal interviews with librarians and people in charge of running special libraries in Libya. Observation and field visits were also used as tools to collect additional data.

4. A database was built to support the analysis of data gathered from the survey and the field study.

5. Statistical techniques were employed to analyse the data in order to obtain information that would assist in answering the research questions.

3.3 Choice of Research Methods

A mixed approach, which consisted of a variety of research methods and data collection techniques, was used in this research. A descriptive research method was used for the first phase of this research through the application of survey techniques. Survey research is a systematic set of methods used to gather information to generate knowledge and to help make decisions. Surveys are frequently used when information is needed from large numbers of individuals. However, because there are a number of ways of obtaining information, the pros and cons of using a survey as a method of data collection should be considered.

A survey based approach involving quantitative and qualitative data collection and analysis was felt to be the most appropriate method to use for this research owing to the number of participants involved in this study and due to the difficulty of observing directly the populations involved in this research. Caputi (2001) states that a survey method is appropriate when you cannot observe directly what you want to study and it is particularly appropriate for large populations. "Self-administered questionnaires and interview schedules are two of the common techniques of data collection within survey method" (Caputi, 2001). According to Colton and Covert (2007) "Surveys can be combined with other data-gathering approaches. For example, researchers may wish to follow-up a survey that has provided information that can be generalised to the population of interest with a number of interviews that can provide details and explanations the survey was unable to capture". In the second phase of this research there was a need to conduct a number of interviews to gather additional data for designing the proposed digital library and to expand upon data collected through the survey.

A study classified as descriptive research attempts to describe systematically a situation, problem, or service, or explains attitudes towards an issue. For example, it may attempt to describe the type of service provided by an organisation. The main goal of this type of research is to illustrate the data and characteristics of what is being studied. This type of research utilises statistical techniques such as frequency analysis and calculation of averages. The main purpose of such methods is to describe what is prevalent with respect to the issue or problem under study. According to Singh (2007) "descriptive research, as the name suggests, enumerates descriptive data about the population being studied and does not try to establish a causal relationship between events. This is also one of its major limitations as it cannot help determine what causes a specific behaviour or occurrence". It is used to describe an event, a

happening, or to provide a factual and accurate description of the population being studied. It provides the number of times something occurs and helps in determining the descriptive statistics about a population, that is, the average number of occurrences or frequency of occurrences. In a descriptive study, things are measured as they are, whereas in an experimental study researchers take measurements, try some intervention and then take measurements again to see the impact of that intervention. A mixed research design including qualitative and quantitative methods was used in a complementary fashion in this study to explore the research objectives. The following figure summarises the research approach applied in this study.

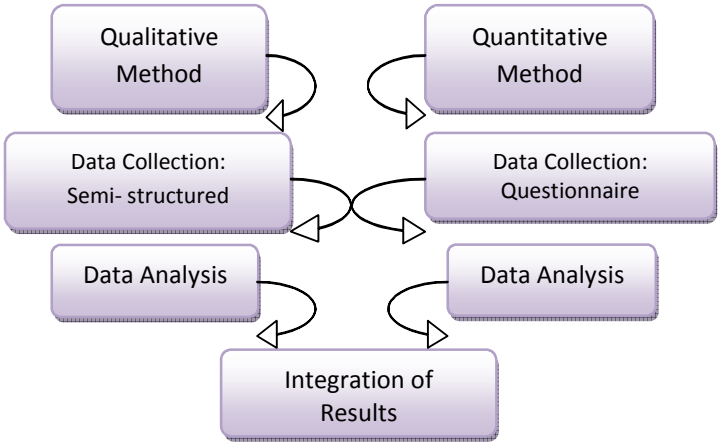


Figure 3.1: Research approach

In practice, it is often the case that multiple methods can be used because research often necessitates the use of multiple methods to achieve triangulation. Gray (2004) concluded that "one reason is that research projects usually include a number of different research questions, so a research method appropriate for one question may be inappropriate for another.

The second reason for using multiple methods is that it enables triangulation to be used". Smith (1991) "refers to data triangulation as the collecting of data over different times or from different sources. Methodological triangulation is also possible, with the use of a combination of methods such as case studies, interviews and surveys".

All methods have their strengths and weaknesses. So not only does the use of multiple methods assist in data triangulation, it helps to balance out any of the potential weaknesses in each data collection method. For example, on the one hand the benefit of a quantitative approach is that the findings from the sample under study will more accurately reflect the overall population

from which the sample was drawn. In addition, quantitative research is often regarded as being purely scientific, justifiable, precise and based on facts often reflected in exact figures (Jonker, 2010). On the other hand, the drawback of the quantitative approach is that, because the study contains so many participants, the answers that research participants are able to give do not have much depth. They have to be superficial, or else the researchers would be overwhelmed by information that cannot adequately be analysed (Vanderstoep, 2009).

Qualitative approaches also have strengths and weaknesses. On the one hand, "the main advantage of qualitative research is that it provides a richer and more in-depth understanding of the population under study" (Somekh, 2005). Techniques such as interviews and focus groups allow the research participants to give very detailed and specific answers. On the other hand, "the main disadvantage of qualitative research is that sample sizes are usually small and non-random, and therefore the findings may not generalise to the larger population from which the sample was drawn" (Vanderstoep, 2009).

For the reasons mentioned above, this study has adopted a mixed or blended approach to explore the research objectives. Table 3.1 compares the key characteristics of quantitative and qualitative research.

Table 3.1: Quantitative versus qualitative research

Characteristic	Quantitative Research	Qualitative Research
Type of data	Phenomena are described numerically	Phenomena are described in a narrative fashion
Analysis	Descriptive and inferential statistics	Identification of major themes
Scope of inquiry	Specific questions or hypotheses	Broad, thematic concerns
Primary advantage	Large sample, statistical validity, accurately reflects the populations	Rich, in-depth, narrative description of sample
Primary disadvantage	Superficial understanding of participants' thoughts and feelings	Small sample, not generalisable to the population at large

(Adopted from Vanderstoep, 2009)

The work progressed in phases where findings from each phase led into the next phase of the work. The first phase of the work comprised a survey of the current state of information services in special libraries in Libya. For this a sample set of special libraries and information centres was selected. Based on the findings of the first phase the research identified some

special collections - printed and/or digital on particular subjects and in various formats - that were of importance to users in special libraries, and a user-centered digital library was designed to meet the requirements of these users. The second phase of this research involved the design of an appropriate digital library service to assist in developing current services. The third phase of this research comprised the evaluation of a prototype digital library designed specifically for the National Oil Corporation in Libya as a suitable solution for developing special library services in Libya. Questionnaires, interviews, document reviews, and field visits were the main tools employed in this research. These instruments were used to collect general and basic data required for this study.

The first phase of the research was designed to examine and analyse the current state of special libraries based on findings from a survey of a selected sample of special libraries and information centres in Libya. The objectives of the first phase were as follows:

- To evaluate the current services and to explore user needs and requirements so that users can get better services in the future.
- To assess the services provided to end-users and to assess their suitability from a user's point of view.
- To conclude with recommendations for improvements.

Various factors as described earlier in table 3.1 were taken into consideration when performing this research. This research adopted a survey approach to find the answers to the research questions identified in chapter one. A survey-based approach involving quantitative and qualitative data collection and analysis was felt to be the most appropriate method to use for this research as survey questionnaires are often used when there is a large number of people from which information and opinions are needed.

Surveys are often referred to as sample surveys because the information that the researcher wishes to gather is usually collected from a selected group of people. It is very unusual for researchers to question all of the people that they wish to study owing to both time and cost considerations. For example, it would be extremely expensive and would take a very long time to ask all special library users whether they have a positive or negative attitude towards a specific service or how they think and feel about certain things such as electronic library services. According to Singh (2007) "descriptive surveys are often undertaken to ascertain attitudes, values and opinions". For example, a survey might examine library users' views about

whether they seem content with the service they are receiving. This research also shares the characteristics of both quantitative and qualitative approaches discussed above. The characteristics of quantitative approaches are a focus on numerical data and statistical analysis, with an emphasis on producing objective, reliable, valid data. Qualitative approaches are characterised by a focus on language (rather than numbers), and an emphasis on participants' interpretations and understandings of their social world. Qualitative data can, however, be sorted and categorised and can also be given numerical values that lend themselves to quantitative analysis (Lewis, 2003).

The use of surveys is considered a quantitative approach because the closed-ended questions typically included in a survey questionnaire produce quantitative data and statistical analysis that can be used to make sense of these data. Nonetheless, surveys might also be considered a mixed-method approach, because some questionnaire items, such as open-ended questions or requests for respondents to offer comments, do produce qualitative data (Silverman, 2008). Kalof (2008) believes that while there are strong and separate traditions of quantitative and qualitative research in the social sciences, the boundaries between the two approaches are becoming more blurred. The reason for using a mixed approach lies in the fact that it can assist to a large degree in avoiding the weaknesses in each data collection technique in addition to gathering the data required for this research from different resources.

According to Colton and Covert (2007) qualitative approaches, such as naturalistic inquiry, are most suitable when trying to understand human behaviour and social relationships in the environment where they occur. Vanderstoep (2009) states that "surveys are typically used to gather factual information or to assess attitudes and beliefs. In addition, depending on the area of interest and the resources available, quantitative and qualitative methods may be used together to broaden the range of information made available and to complement the data collected under each approach". Figure 3.2 provides a more detailed, step-by-step analysis of the research methodology adopted for the first phase of this research.

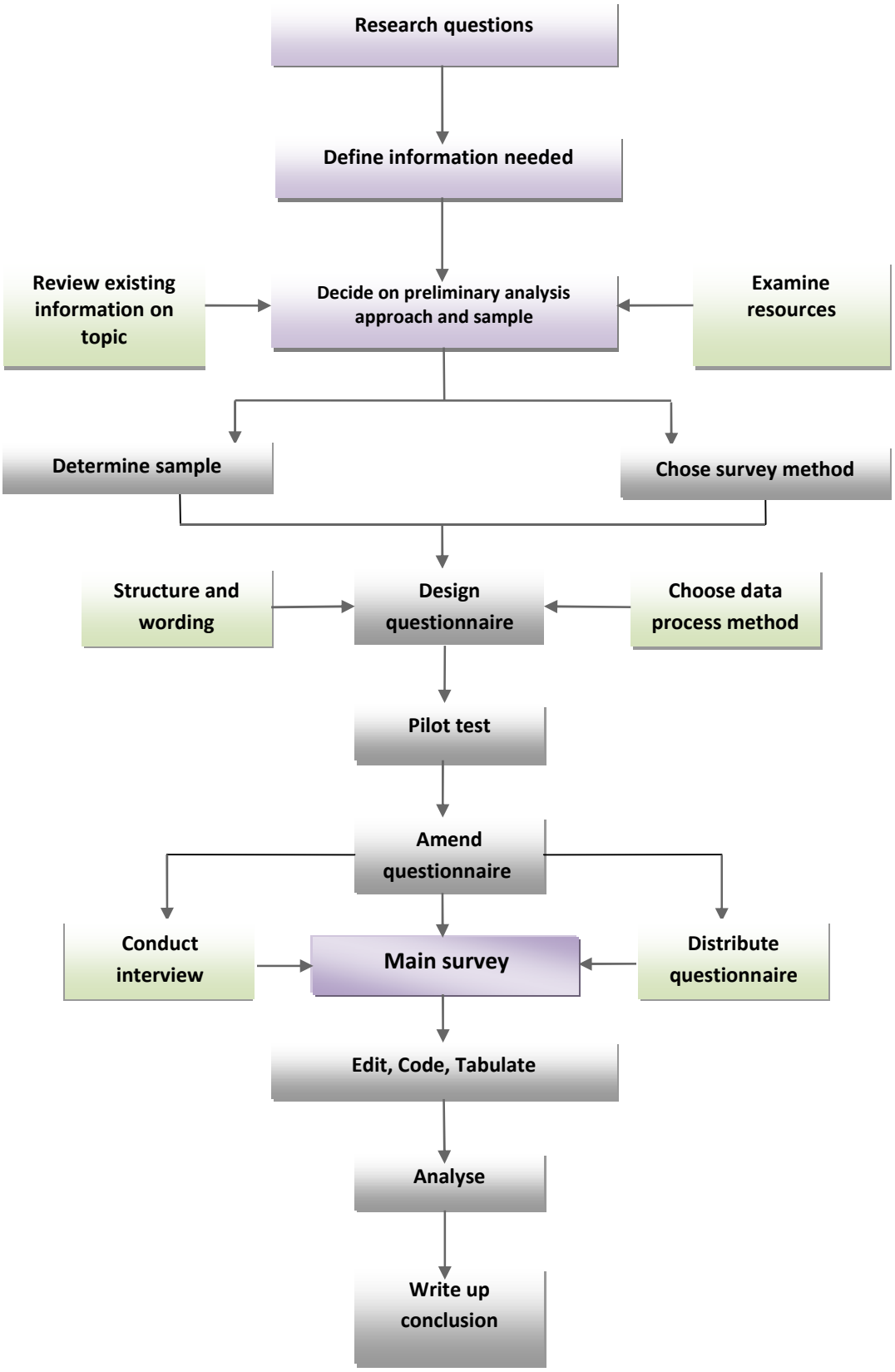


Figure 3.2: Research methodology

3.4 Design Issues and Options

In identifying the most appropriate design and methodology for this research several important issues and options, as highlighted by Patton (2002) were considered. These are summarised in table 3.2.

Table 3.2: Design Issues and Options

Issues	Design Options and Concerns	Options Selected for This Research
What is the primary purpose of the study?	Basic research, applied research, Summative evaluation, formative evaluation , action research	Based on applied research
What type of data will be collected?	Quantitative, qualitative, or both	Both qualitative and quantitatative
What will be the sampling strategy or strategies?	Purposeful sampling, probability sampling, Variations in sample size from a single case study to a generalisable sample.	Stratified sample which was derived from probability sampling.
What type and degree of control will be exercised?	Naturalistic inquiry (no control), experimental design, quasi-experimental design.	A descriptive research method through the application of survey techniques for the first phase and quasi-experimental design for the second phase.
What analytical approach or approaches will be used?	Inductive, deductive, content analysis, statistical analysis, combinations	Statistical analysis for the first and third phase and Inductive in the second phase.
Time issues: When will the study occur? How wil the study be sequenced or phased?	Long-term fieldwork, exploratory phase to confirmatory phase, fixed times versus open timelines.	The study progressed in phases where findings from each phase led into the next phase of the work within a fixed time frame.
How will logistics and practicalities be handled?	Gaining entry to the setting, access to people and records.	Most of the fieldwork involved going to the selected organisations.
How will ethical issues and matters of confidentiality be handled?	Informed consent, protection of human subjects.	Addressing ethical issues which include dealing with informed consent and confidentiality issues.
What resources will be available? What will the study cost?	Personnel, supplies, data collection, materials, analysis time and cost, reporting.	The materials and resources used include software for references and other PC application as well as PC itself, People resources include supervisor, specialists in related area, contact persons and relevant personnel within selected libraries.

(Adopted from Patton, 2002)

3.5 Data Collection and Fieldwork Strategy

As explained previously, a survey approach using a combination of questionnaires, observation, document reviews, and field visits was selected as the most appropriate method of data gathering for the first phase of this research. It was hoped that using the combination of these tools would increase validity, as the strengths of one data collection tool can compensate for the weakness of another tool. According to Patton (2002) the limitations and weakness of observation can be in the form of distorted data due to the biased perception of the observer or the possibility that the observer may affect the situation being observed in some ways. Therefore, other data sources such as interview and organisation documents are needed to understand the phenomena being researched in more detail.

3.5.1 Questionnaire

Questionnaire design is the process of designing the format and questions for the survey instrument that will be used to collect data about a particular phenomenon. “One goal of the questionnaire design process is to reduce the total amount of measurement error in a questionnaire” (Encyclopaedia of survey research methods, 2008). According to Brace (2004) the role of the questionnaire is to obtain the information that is required to enable the researcher to answer the objectives of the survey. The advantages of the questionnaire are that information can be gathered from a group of selected people, and the responses are gathered in a standardised way. In addition the questionnaire method can be used to study aspects such as users’ preferences and their attitudes and beliefs. Researching these aspects was an important step before developing the NOC prototype digital library.

A questionnaire must not only collect the data required, but collect the data in the most accurate way possible. A well-designed questionnaire is important, and the clarity and the language used to construct the questionnaire must be chosen with care. This is because a clear and concise questionnaire will help to get the best responses from the potential respondents. A set of guidelines (Brace, 2004) was referred to, to ensure that the questionnaire was well designed.

In order to design an effective survey the following ideas were applied to the three questionnaires.

- Provide an introduction to the survey to encourage cooperation from target respondents.

  This involved providing a title at the top of the page that informed the respondent about the survey's topic followed by a note welcoming the respondent to the survey. Immediately after that information was provided about the purpose of the survey. This was followed by a privacy statement which emphasised that all information provided in response to this questionnaire would be reported anonymously and treated in the strictest confidence and would not be used for any other purpose.
- Divide the questionnaire into sections.

  The first section was used for gathering background information on respondents while the following sections were used for gathering information on the topics covered by this research.
- Use open-questions appropriately.

  At the end of particular questions respondents were prompted to add any comments they thought might be useful.
- Include a conclusion to thank respondents for their time.
- Pre-test questions before distributing.

  The questionnaires were assessed in terms of their layout design, wording of questions, and some modifications were made as a result.

3.5.1.1. Librarian Questionnaire

The first questionnaire was designed to collect data from librarians about the ICT infrastructure and information services in selected special libraries in Libya. The first questionnaire was divided into three main sections. The first set of questions was written to collect data and general information about the library and the librarian.

The purpose of the next set of questions was to collect data about current or existing technical services including cataloguing and classification, indexing, abstracting, and bibliographic services. The final part of the questionnaire was aimed at collecting data about user services to assist in developing information about the following services: retrospective search services, reference services, current awareness, and selective dissemination of information services.

3.5.1.2. User Questionnaire

The user questionnaire was designed with the aim of gathering and collecting data from users in selected libraries in Libya regarding their opinions with respect to special library services. The analysis of this data helped to explore users satisfaction with the services provided, to find evidence about the current information services, and to examine the extent to which special libraries in Libya have been successful in meeting the needs and requirements of their clients. The second part of this questionnaire focused on information and communication skills (ICT literacy) of special library users.

The issue of ICT literacy is considered to be of great importance especially when implementing digital library services, as users might not make use of the services because of a lack of the ICT skills necessary to exploit such services. As is well-known building or constructing very sophisticated systems or services for unskilled users will be meaningless if users are incapable of exploiting a service and making the most of it.

3.5.1.3 Management Questionnaire

This questionnaire was designed with the aim of gathering data pertaining to information policies and strategies in selected special libraries and information centres in Libya. The questionnaire was intended to assist in collecting data about various subjects relating to organisational policies regarding copyright and information infrastructure in the sample of libraries and information centres.

All three questionnaires contained different types of questions e.g. Yes or No questions, open-ended questions, and scaled questions using a five-point Likert scale. The types of questions used in the three questionnaires varied according to the data which need to be collected from the sample.

The method protocol was given full approval by the ethics committee within the department of Computer and Information Sciences (CIS) at the University of Strathclyde. Following approval, a pilot test was conducted in order to debug and correct the questionnaires. All three questionnaires were distributed with a cover letter from the research supervisor and an ethical approval letter from the University of Garyounis in Libya.

3.5.2 Interview

Interviews are one of the dominant methods in qualitative research (Flick, 2007) However, “one drawback of using interviews is that the data obtained may not be appropriate for extensive statistical analysis because they simply describe a construct rather than quantifying it” (Singh, 2007). This instrument was used for the second phase of this research as the main tool for gathering data required for this study despite the limitations mentioned earlier. It was felt in the second phase of this research that the questionnaire technique would be unable to capture certain details and clarifications needed for this stage and that the usual structured questionnaire would be insufficiently informative. Therefore, a number of semi-structured interviews were carried out to gain data and information from interviewees to assist in designing the proposed digital library.

There are three main types of interview: structured, semi-structured, and unstructured. The reliability and validity of the data collected from the interview varies with the type of interview employed as well the experience of the interviewer (Kvale, 2007; Ruib and Rubin, 2005). An unstructured interview is often seen as an informal interview that is not based on a prescribed list of questions. It is a spontaneous conversation, not a specific set of questions asked in a predetermined order. “This type of interview can go in any direction and it is therefore said that there is no one right way to do an unstructured interview. However, the interviewer should follow some general rules for conducting unstructured interviews such as avoiding leading questions, probing beyond the expected answer, and recording the participants' own words” (Kvale, 2007).

Semi-structured face-to-face interviews mainly consist of open-ended questions based on topics the researcher wants covered in the interview. Although the interview focuses on key topics, there is also the opportunity to discuss, in more detail, some particular areas of interest. The interviewer has the opportunity to explore answers more widely or other areas of discussion spontaneously introduced by the respondent (Encyclopaedia of Survey Research Methods, 2008).

In a structured interview the interviewer has a standard set of questions that are used with all participants. The interviewer asks a series of questions and ticks boxes and makes notes based on responses. In structured interviews the interviewer asks each respondent the same questions in the same way. Structured interviews are used frequently in market research. This

type of interview is usually used for large projects for which the researcher wants the same data to be collected from each respondent.

“Structured interviews are used in quantitative research and can be conducted face-to-face or over the telephone” (Dawson, 2002).

For this research semi-structured interviews were used because of the following expected benefits:

- They are less intrusive to those being interviewed as the semi-structured interview encourages two-way communication. Those being interviewed can ask questions of the interviewer.
- They can be used to confirm what is already known but they also provide the opportunity for learning. Often the information obtained from semi-structured interviews will provide not just answers, but also the reasons for the answers. When individuals are interviewed, they may more easily discuss sensitive issues.

This research started with the identification of the broad problem area described in chapter one and exposed by the initial literature review. By specifying the research problems in terms of key themes (current state of library services, electronic library services, digital libraries) it was possible to generate a number of research questions which could be constantly compared with the emergent data.

Interviews were conducted with managers and personnel who were responsible for running the central library of the National Oil Corporation. Personal interviews were employed as essential information, such as management’s policy and vision towards moving to electronic services, could be collected which would assist the researcher in designing the proposed digital library and could contribute to some extent to getting answers for some specific questions as discussed below.

Three semi-structured interviews were conducted to gather information related to ICT infrastructure, currently used IT applications, and information resources and services in the energy sector. The first interview was conducted with the manager of the information unit in the National Oil Corporation (NOC) and the second interview was conducted with the librarian responsible for running the central library of the NOC. The third interview was conducted with the system support manager in the same organisation. These semi-structured interviews assisted in creating the proposed digital library as they enabled the researcher to establish which IT applications were used within the NOC, management policy and vision with respect to

moving to electronic services, and a better understanding of the ICT infrastructure. The approach used for conducting the interviews involved one-to-one interviews in which individual respondents were questioned at length about a particular issue, experience, or event. This approach was chosen for conducting the interviews because it was felt to be the most appropriate method to use for this research since in-depth one-to-one interviews are designed to explore issues in detail with the interviewee. This can be helpful in that the researcher and the respondent are given the opportunity to query questions and answers, and to verify that they have a shared understanding of meaning. Furthermore, "this technique may offer the opportunity to ask follow-up questions based on participants' responses to previous questions. This allows deeper exploration of issues" (Vanderstoep, 2009). According to Henn and Foard (2006) "what is central to in-depth interviews, regardless of how the emerging data is perceived, is that they provide qualitative depth by allowing interviewees to talk about the subject in terms of their own frames of reference. In so doing, the method enables the interviewer to maximise her or his understanding of the respondent's point of view".

The focus groups approach is an alternative method but it is usually designed for those who want to assess how several people work out a common view, or the range of views about some topic. Therefore, the focus group, or group discussions, approach was felt to be inappropriate for the purpose of this research.

The interviews were conducted with an initial set of probing questions categorised in three parts: implementation of ICT infrastructure, electronic library services, and information strategies and policies. The following are a sample of the interview questions. To the right of each interview question are codes (S1, S2….G1, G2) referring to the specific initial interview questions.

1. What is the current statues of ICT infrastructure in the NOC ?……S1, S5
2. What are the factors considered barriers to the implementation and effective use of electronic library services?……G2,G4
3. What could be the impact of delivering electronic library services on organisational performance? ……S2,S6
4. What are the current approach and strategies with regards to the implementation of ICT infrastructure? ……S3
5. What are the important issues and concerns regarding the company's copyright regulation?……G3,G5

The interviews were conducted in face-to-face mode by arrangement through a brief introduction made via telephone. An interview summary form was produced to record practical details about the time and place, the participants, the duration of the interview, etc., as well as the responses.

3.5.3 Observation

In the context of science, observation means more than just observing the world around us to get ideas for research. Observation also refers to the process of making careful and accurate measurements, which is a distinguishing feature of well-conducted scientific investigations (Festinger, 2005).

This research was validated through direct observation. Although the outcomes of direct observations are unlikely to be of much value on their own, contributions can be made if this tool is used in conjunction with personal interviews and questionnaires because these tools are complementary to each other.

Adams (2007), states that some of the most important findings in research have been accidental and captured from observations of the failures of other data collection methods. Therefore, the researcher visited all the selected information centres and special libraries to collect information and to observe the real condition and present state of libraries included in the study.

3.5.4 Document Reviews

For this research, various items of documentation were obtained from the organisation's websites or offline from the contact person. These included any publically available annual report, as well as internal and administrative documents, including progress reports and strategy guidelines. These documents were used in conjunction with the information obtained from the questionnaire distributed to librarians and managers of information units in the selected sample.

3.5.5 Field Visits

Some field visits were arranged to special libraries and information centres that matched special library characteristics after consulting the National Institute for Scholarly Research in Tripoli in December 2006 and January 2007. Identifying special libraries was of great importance in assisting the researcher to classify these institutions into different sectors according to their subjects and specialisation. These libraries were allocated to different sectors and a representative stratified random sample was selected to represent the research population. The researcher considered this type of sampling to be the most appropriate method for this research owing to its suitability for representing the research population for the following reasons:

- The sample comprised various types of libraries and information centres spread geographically over the country.
- The sample covered special libraries from different sectors, not just one sector.

A small manageable sample was selected to represent all sectors of special libraries and information centres in the country. It is also worth mentioning in this context that despite precautions, it is enormously difficult to avoid cross-classification when allocating institutions and organisations to sectors. The following provides some brief information on the sectoral categories covered in this research.

1- Government departments

This category contains the main government departments in Libya. Most of these departments are located in the city of Sirt with a smaller group in Tripoli. Most government departments in Libya do not have a special library or information centre and therefore this study only included those departments which had a special library.

2- Government organisations

This category includes special libraries and information centres of organisations that receive some government funding or aid but do not fall within the government department category discussed above. Libraries in this sector are scattered over different places and cities in the country.

3- Financial companies

This category comprises libraries of institutions connected with finance, banking and insurance in Libya. They are also located in different cities in the country. This category does not include

all institutions working in this sector because some of them have either a very small library or no library at all, as recorded in the directory of special libraries.

4- Energy

This category includes libraries and information centres in the oil and gas field. It includes 29 libraries and information centres which belong to oil companies. Most of these libraries are located in the two major cities of Tripoli and Benghazi, although some of them are located in other cities in the country.

5- Legal organisations

This category covers law libraries and government legal libraries in Libya. Some legal libraries have been excluded because they only have archives and do not provide library services.

6- Health

This category covers libraries in health institutions and hospitals which are located in different cities in the country. The list of health libraries contains twelve libraries in Libya as not all hospitals own a library.

7- Higher specialised institutes

This category includes libraries in higher education institutions. It does not include university libraries as these are considered by the researcher dissimilar to special libraries, which are usually focused on specific disciplines making them distinguishable from university libraries. The list contains about 35 libraries scattered over different higher educational institutions in the country.

8- Research and documentation centres

This category incorporates documentation and information centres in Libya. The main reason for choosing these documentation and information centres lies in the development of scientific research across all areas in Libya at the present time. The list of information centres in this domain contains 31 information centres spread over different cities in the country.

3.6 Research Sample

Sampling is defined as the process of selection of sampling units from the population to estimate population parameters in such a way that the sample truly represents the population. Singh (2007) defines a sample as a finite part of a statistical population whose properties are used to make estimates about the population as a whole. When dealing with people it can be defined as a set of target respondents selected from a larger population for the purpose of a survey. "Generalisability of the research findings is, of course, dependent upon the sampling procedures. And ideally either a representative or random sample would be desirable to provide maximum information about the generalisability of research data" (Zeger, 2007).

O'Leary (2004) states that in studies with goals of generalisability, sampling will involve using the most practical procedures possible for gathering a sample that best represents a larger population. The process of selecting an appropriate sample for this research to represent the research population satisfactorily and adequately is described below.

Firstly, there was a need to identify the number of special libraries and information centres in Libya and the location of each library since libraries are distributed across different cities. Therefore, the researcher developed a working list of special libraries and information centres in Libya by undertaking a review of a directory of special libraries along with published literature about special libraries in Libya. This revealed that the current official directory of special libraries in Libya was not up to date. In the light of that the researcher asked the Foundation of National Scientific Research to supply him with a list of special libraries and information centres in the country. This list was then translated into English to be part of the research and the annex of the study.

3.7 Sampling Frame

The sampling frame is defined as the frame of entities from which sampling units are selected for a survey (Singh, 2007). The mechanism used for selecting a sample of special libraries and information centres was as follows:

After the categorisation of special libraries and information centres into different sectors, a stratified random sample was selected to represent the research population. The researcher came to the decision to take a small manageable sample to represent the research population for reasons such as cost considerations (i.e. a desire to minimise cost) and research deadlines. Using a stratified random sample this large pool of libraries and information centres was

divided into several sectors (strata) and then libraries were randomly selected from within each sector. Proportionate stratified random sampling was used in this research to ensure that key groups within the population were adequately represented in the sample.

Denscombe (2003) defines a stratified sample as one in which every member of the population has an equal chance of being selected in relation to their proportion within the total population.

Fink (2003) views a stratified sample as one in which the population is divided into subgroups or strata and a random sample is then selected from each subgroup. The method used to create the sample was as follows:

- Determine the size of the sample to be selected from the original research population based on a 10% sampling method. A 10% sample was assumed to be suitable due to the following:

- Questionnaires had to be distributed personally by hand due to the weakness of postal services in Libya and lack of any other viable form for communications such as emails**.**

- The sample fairly represented various geographical locations of the country (a large numbers of organisations and institutions in Libya do not have a website or email service).

- The research population was spread over a very large geographical area. Czaja (1996) states that "mail is the cheapest survey method, followed by telephone surveys; face-to-face surveys are the most expensive". For reasons of convenience and cost a small and representative manageable sample was selected.

$$\text{Sample size} = \frac{169}{100} \times 10 = 16.9 = 17 \text{ libraries}$$

- Classify into the research categories that make up the research (i.e. categorise the libraries by sector) to identify the research population:

Table 3.3: Categories of research population

No	Sectors	Number of libraries
1	Government departments	21
2	Government organisations	13
3	Financial companies	17
4	Energy organisations	29
5	Legal organisations	10
6	Health libraries	13
7	Higher specialised institutes	35
8	Research and documentation centres	31
	Total	169

- The first step was to find the total number of libraries (169) and calculate the percentage in each group.

- Determine how many, proportionately, of this sample should be allocated to each sector.
- A random sample from each stratum was taken, in a number proportional to the stratum's size when compared to the population. These subsets of the strata were then pooled to form a random sample.

Table 3.4: Sectors from which the sample was drawn

No	Sectors	Number of Organisations	Percentage	Sample size
1	Government departments	21	12%	2
2	Government organisations	13	08%	1
3	Financial companies	17	10%	2
4	Energy organisations	29	17%	3
5	Legal organisations	10	06%	1
6	Health libraries	13	08%	1
7	Higher specialised institutes	35	21%	4
8	Research and documentation centres	31	18%	3
	Total	169	100%	17

This shows the components of the random sample

Table 3.5: How the sample was selected

12% should be government departments	**12% of 17 is 2.04**	**=2**
08% should be government organisations	**08% of 17 is 1.36**	**=1**
10% should be commercial companies	**10% of 17 is 1.07**	**=2**
17% should be energy organisations	**17% of 17 is 2.89**	**=3**
06% should be legal organisations	**06% of 17 is 1.02**	**=1**
08% should be health libraries	**08% of 17 is 1.36**	**=1**
21% should be higher specialised institutes	**21% of 17 is 3.57**	**=4**
18% should be research centres	**18% 0f 17 is 3.06**	**=3**
Total		**17**

A randomiser was used to generate the random sample

Table 3.6: To clarify how the sample was selected using stratified sample

No	Sectors	Number of Organisations	Percentage	Sample size	Generated sample
1	Government departments	21	12%	2	1, 21
2	Government organisations	13	08%	1	5
3	Commercial and financial	17	10%	2	3, 16
4	Energy organisations	29	17%	3	2, 14, 16
5	Legal organisations	10	06%	1	7
6	Health libraries	13	08%	1	8
7	Higher specialised institutes	35	21%	4	12,22,24,27
8	Research and documentation	31	18%	3	10,16,29
	Total	169	100%	17	

The survey was conducted from July to October 2007. 17 Libraries and information centres were chosen out of 169. Among these institutions were 12 special libraries and 5 information centres as demonstrated in Table 3.7.

Table 3.7: Selected sample of libraries and information centres

ID	Library Name	Sector	Organisation Name	Location
1	Library of the Great Man-Made River Project	Government organisations	Great Man-Made River Project	Benghazi
2	Library of Central Bank of Libya	Commercial and financial companies	Research And Statistics Department- Central Bank Of Libya	Tripoli
3	The Central Library of National Oil Corporation	Energy	National Oil Corporation	Tripoli
4	The Scientific Library at the Arabian Gulf Company for Oil Exploration	Energy	Arabian Gulf Company For Oil Exploration	Benghazi
5	The Legal Library	Legal institutions	Court Of Appeal – Derna	Derna
6	Library of Misrata General Hospital	Health	The General People's Committee For Health-Misrata	Misrata
7	Library of Advanced Centre for Administrative and Financial Occupation	Higher specialised institutes	Advanced Centre For Administrative And Financial Occupation	Benghazi
8	Library of Advanced Centre for Computer	Higher specialised institutes	Advanced Centre For Computer	Derna
9	Library of Management Institute	Higher specialised institutes	Management Institute	Benghazi
10	Library of Graduate Institute of Medical Technique	Higher specialised institutes	Graduate Institute Of Medical Technique	Derna
11	Library of Libyan Jihad Centre for Historical Studies	Research and Documentation centres	Jihad Centre For Historical Studies	Tripoli
12	Economic Sciences Research Centre	Research and Documentation centres	Economic Sciences Research Centre	Benghazi
13	Library and Research Centre for the Studies of the Green Book	Research and Documentation centre	Research Centre For The Studies Of The Green Book	Elbyda
14	Library of Company of Libya for Insurance	Financial companies	Company Of Libya For Insurance	Tripoli
15	Information Unit of Jowef Oil Technology	Energy	Jowef Oil Technology	Benghazi
16	Library of the General People's Congress	Government departments	The General People's Congress	Sirt
17	Library of the General People's Committee for Higher Education	Government departments	The General People's Committee For Higher Education	Tripoli

The selected libraries and information centres were scattered across different cities in the country. Some of them were located in the east of Libya and some were located in the west of the country. The survey focused on the information infrastructure in special libraries and information centres in terms of the following five components:

- ICT infrastructure
- Staffing
- Resources
- Services
- Systematic frameworks (organisational structures) Systematic frameworks means in this context: policies, legislation, plans and programmes necessary to achieve the objectives defined in advance for the benefits of the entire institution.

3.7.1 Non-Response Errors

There are two types of bias from non-responses as described by Denscombe (2003):

- Non-response through refusal. This error can be minimised by designing the questionnaire to be as brief and easy to understand as possible to motivate participation yet without affecting the main objective(s) of the survey.
- Non-response stemming from non-contact. For the survey that was conducted in this study, this type of bias was not relevant as the respondents were contacted personally and the questionnaires were distributed by hand.

3.7.2 Measurement Error

Measurement errors can occur due to: poor question wording; poor questionnaire design in terms of the visual layout, question form, number of questions per page, etc., or some aspect of the respondent's behaviour such as lack of motivation or comprehension problems (Dillman, Tortora and Bowker, 1999). To minimise this error, a good survey design is necessary as Couper (2000) suggested that "the survey instruments must be easy to understand and to complete, must be designed to keep respondents motivated to provide optimal answers, and must serve to reassure respondents regarding the confidentiality of their response". The design of the questionnaire used for this study has been discussed earlier in section 3.4.1.

3.8 Pilot Testing

This stage involves the testing or piloting of elements such as survey questions and data collection tools. Several drafts of the research tools were tested before a satisfactory version was reached. According to Hakim (1994) a pilot test is an initial test of the survey, before it is made final: “The pilot test is conducted with members of the target population and in the same setting as the actual survey”. It was crucial at a very early stage to undertake a pilot study before distributing the final questionnaires to selected special libraries and information centres in Libya. As is well known, there are some issues related to the size of a research sample. In general, the appropriate size of the sample depends upon factors and issues such as the nature of the research population, the data to be collected, financial support, and time available to the researcher. Since the researcher at this stage was concerned with establishing an appropriate and representative sample the pilot study was necessary to avoid any mistake that might influence the research results negatively. The importance of undertaking a pilot study lies in the fact that such studies are vital for verifying the correct way to conduct a survey. In addition measuring the clarity of the statements of the questionnaires was considered an essential matter for interpretation of collected data in order to reach valid results which reflected the current scenario of special library services.

Due to a general lack of guidelines for determining the size of a pilot study, as well as a general lack of references about the size of such a sample, 45 questionnaires were distributed to a random sample of special library users in different organisations and institutions. This figure was assumed to be sufficient for getting satisfactory feedback and for getting a good indication of any issues before distributing the final questionnaires. It was also important to get to know potential users in selected institutions and organisations that might benefit from using the special library before distributing the final questionnaire as the number of potential users varied from one organisation to another depending on the number of employees in each one and according to its size and activity. In order to do so, it was necessary to find out the numbers of departments and administrative units in each organisation and the numbers of employees and research workers in each department. Employees and research workers in every department and administrative unit were considered potential users of the special library. Once the number of employees in each department and management was gathered a stratified sample was established to represent the research population.

3.8.1 Pilot Test Sample

Three organisations were chosen in a random way from the 169 libraries and information centres to distribute the questionnaire to employees and research workers within these organisations. The organisations were as follows:

- National Petroleum Corporation in Tripoli
- AGOCO - Arabian Gulf Oil Company in Benghazi
- Great Man-Made River Project in Benghazi

Fifteen questionnaires were distributed to each organisation.

The mechanism used for selecting a sample of library users was based on the following examples:

According to the labour force statistics for the oil and gas sector published by the Manpower Planning Department in Libya in September 2007, the number of employees and workers at the National Oil Corporation was about 908 as demonstrated in table 3.8.

Table 3.8: To clarify the distribution of potential users in the National Oil Corporation

Administrative departments	Potential users	Percentage	Sample size
Management of planning and research	92	10%	1
Management of investment	97	11%	2
Manufacturing and marketing	173	19%	3
Exploration and production management	159	17%	3
Administrative affairs	87	10%	1
Financial management	95	11%	2
Information management	55	5%	1
Personnel management	68	8%	1
Training and development	82	9%	1
Total number	908	100%	15

Thirty questionnaires were also distributed to research workers and employees in another two organisations using the same procedures. These were:

- AGOCO Arabian Gulf Oil in Benghazi
- Great Man-Made River Project in Benghazi

All the questionnaires were distributed by librarians to the targeted users in different administrative units and departments within selected organisations. Three questionnaires were also distributed to librarians in the same organisations to get feedback about issues focused on ICT and special library services.

3.8.2 Pilot Test Data

38 questionnaires were completed out of the 45 which were distributed to special library users, representing a response rate of 84%. This response rate was felt to be high and valid. According to Singh (2007) "Validity is an intuitive process and is established by asking other people whether the measure seems to capture the concept that is the focus of attention". To ascertain the validity of the research instruments some steps were taken as described in 3.9. According to the Sage Encyclopaedia of Survey Research Methods (2008) the response rate of a survey is a measure of how many people completed the survey (expressed in a percentage from 0% to 100%). It is usually assumed that the higher the response rate, the more likely the results are representative of the populations provided the sampling is appropriate in the first place.

This figure was judged also to be statistically reliable and acceptable and gave a good indication regarding the effectiveness of the design of the user questionnaire. Reliability is defined by the Sage Encyclopaedia of Qualitative Research Methods (2008) as the dependability, consistency, and/or repeatability of a project's data collection. According to Singh (2007) "reliability signifies the issue of consistency of measures, that is, the ability of a measurement instrument to measure the same thing each time it is used". In order to measure the research tool, the researcher used multiple forms. This tests the reliability of the research instrument by mixing up the questions in the research instrument and giving it to the same respondents again to assess whether it results in any different responses.

The librarian questionnaire achieved a 100% response rate. The returned questionnaires were then reviewed and the feedback was then used to improve the instrument. A summary of the

problems which were encountered in the design of the user and librarian questionnaires is given below.

With regards to the user questionnaire:

- Some statements were not plain enough and this caused a lack of understanding with regard to some of the questions.
- English terms used in the questionnaire were not understandable in some cases.
- Some technical terms were not comprehensible for a number of users such as virtual environment, distance learning and E- Conferencing.
- Some technical terms related to library services were not understood such as selective dissemination of information services, current awareness services and retrospective search services.

With regards to the librarian questionnaire:

- The feedback showed that the questionnaire was over-long and needed to be modified and that some questions needed to be eliminated.
- Some terms also were not comprehensible enough especially in the section regarding networking and manipulating data and information such as connection medium and type of exchanged data.
- Some respondents felt that statements were not obvious which caused difficulty in terms of understanding some of the questions.
- The questions regarding information policies and strategies were somewhat difficult to follow and needed to be rewritten and explained in plain Arabic.

3.8.3. Corrections and Modifications

The completed questionnaires were used to review and edit the questionnaire before its final distribution. A number of steps were taken to improve this instrument. Firstly, it was felt that there was a need to consult an Arabic language professional who could correct and edit language mistakes. Therefore, a lecturer at the department of Arabic language and literature in the Faculty of Arts and Education at the University of Garyounis reviewed the language used in the questionnaires. All questionnaires were edited and rewritten according to his advice. A summary of the corrections and alterations which were made is given below:

- The questionnaire which dealt with information policies and strategies was rewritten in plain Arabic language and the terms that were found to be difficult were altered and written in simpler language.
- The questions and statements in the questionnaire which dealt with ICT and library services were reduced while retaining the basic structure and not deleting any relevant questions.
- All statements which were felt to be ambiguous were edited and rewritten.
- English terms that were used in the questionnaire were changed into Arabic language to avoid misunderstanding.
- All technical terms were explained in order to be more comprehensible for users. In addition, terms used to represent technical library services were described in a simpler way.
- All terms in the section on networking and manipulating data, such as comprehensive coverage and partial coverage, were altered to plainer Arabic language.
- All statements, which were found to be difficult for the users were deleted and replaced with simpler statements.

3.9 Validity of the Questionnaire

To ascertain the validity of the research instruments all the questionnaires were sent to a group of referees consisting of four specialists in the field of education and psychology. Each one of them was asked to give his opinion of the content of the questionnaire to ensure the accuracy of its drafting and its ability to capture the data required. Textual elements that were not received well by the referees were deleted and some amendments were made to the content of the questionnaire to ensure that the data required would be dependable in order to ensure a high degree of credibility and consistency.

3.10 Analysis Strategy

Statistical procedures allow researchers to describe groups of individuals and events, examine the relationships between different variables, measure differences between groups and conditions, and examine and generalise results obtained from a sample back to the population from which the sample was drawn (Krzanowski, 2007). Based on the purpose of this study, and guided by several options of analysis strategies provided by Patton (2002) as illustrated in (Table 3.9), this research adopted a mainly deductive analysis approach as its data analysis strategy and also utilised some aspects of inductive analysis to analyse data gathered from

open-ended responses gathered from the questionnaire distributed to the selected sample of respondents and the interviews which were conducted in the second phase of this research.

Table 3.9: Analysis Strategies

Analysis Strategy	Description
1. Unique case orientation	Assumes each case is special and unique; the first level of analysis is being true to, respecting, and capturing the details of individual cases being studied.
2. Inductive analysis and creative synthesis	Immersion in the details and specifics of the data to discover important patterns, themes, and interrelationships; begins by exploring, then confirming; guided by analytical principles rather than rules; ends with a creative synthesis.
3. Holistic perspective	The whole phenomenon under study is understood as a complex system that is more than the sum of its parts; focus on complex interdependencies and system dynamics that cannot meaningfully be reduced to a few discrete variables, cause and effect relationships.
4. Context sensitivity	Places findings in a social, historical, and temporal context; the possibility of meaningfulness of generalisations across time and space.
5. Voice, perspective and reflexivity	The qualitative analyst owns and is reflective about her or his own voice and perspective.

(Source: Patton, 2002)

Statistics is well known as the body of mathematical techniques or processes for gathering, describing, organising and interpreting numerical data. For this research, a descriptive statistical analysis was used for the first phase of this research. According to Festinger (2005) descriptive statistics are used to describe the data collected in research studies and to characterise the variables accurately under observation within a specific sample.

Because quantitative and qualitative data demand distinct treatment, with quantitative data analysed statistically and qualitative data analysed thematically, it was important for this research to use inductive analysis for qualitative data and deductive analysis for quantitative data. An elementary statistical technique of analysis was used for describing, organising and interpreting numerical data in the first phase of this research. This included: calculating the frequency of distribution in percentages of items under study and calculating measures of central tendency (e.g. mean, median, mode), establishing norms, and graphical presentation of data (e.g. frequency polygon curve, histogram, pie charts, and graphs). According to Festinger (2005) the central tendency of a distribution is a number that represents the typical or most representative value in the distribution. Measures of central tendency provide researchers with a way of characterising a data set with a single value. The most widely used measures of central tendency are the mean, median, and mode. The analysis of data gathered from the user questionnaire depended mainly on the previously mentioned statistical analysis as it was felt to be the most appropriate method to use since what actually the researcher wants to establish from such data is to get an idea about user profiles and what they need and require in order to help in the design of the proposed digital library. So this elementary statistical analysis was judged to be adequate for the purpose of this study. Data gathered through interviews in the second phase for this research were inductively analysed. According to Patton (2002) inductive analysis contrasts with the hypothetical-deductive approach of experimental designs that require the specification of main variables and the statement of specific research hypotheses before data collection begins. Inductive analysis in this phase involved reading and re-reading the field notes to help in gaining familiarity with the data and also to help start the process of structuring and organising the data into meaningful units.

Data were deductively analysed in the third phase of this research using descriptive statistics. A Likert scale was used in the third phase to measure user attitudes towards the prototype digital library which was designed for the NOC. Data gathered using the Likert scale in the third phase of this research were statistically analysed.

3.11 Options for Administering Surveys

Researchers have several options for survey data collection. These are:

- Telephone-based survey
- Postal-based survey
- Web-based survey
- Face-to-face interview

"Like most decisions in social research, there is no single perfect solution. Rather, each choice comes with advantages and disadvantages" (Vanderstoep, 2009). Table 3.10 summarises the benefits and drawbacks of different survey options.

Table 3.10: Advantages and disadvantages of various options for administering surveys

Data collection option	Advantages	Disadvantages
Telephone	Most people have telephones, creating a large sampling frame. Higher response rate than surface mail. Little work for respondents	Lower participation rate Selection bias: those with unlisted numbers and those who use only cell phones are not in sampling frame
Surface Mail	Addresses are easy to purchase through database company, creating a large database that is the most representative of all sampling frames. Respondents can complete the survey at their own pace, providing long, written, narrative answers and therefore thorough data	Low response rate, unless incentives are involved or population has vested interest in survey. Expensive in terms of labour and postage. More work for respondents than telephone survey. Postcard follow-ups must be used to improve response rate.
Internet/Email	Low cost; minimal set-up costs and no sending charge Less work for respondents than surface mail (but more than telephone), provided respondents have access to the Internet. Larger sampling frame than other techniques.	Response bias: those with technological resources and knowledge or computers are more likely to respond.
Face-to-Face Interview	Very thorough data, both quantitative and qualitative. Allows for probes and follow-up questions to tailor interviews based on respondents' unique knowledge or experience.	Expensive in terms of labour Costs. Smaller sample size than other techniques.

(Source: Vanderstoep, 2009)

3.12 Main Survey

Seventeen questionnaires were distributed personally by hand to librarians in the selected libraries and information centres along with a cover letter from the research supervisor. Questionnaires had to be distributed personally by hand due to the weakness of postal services in Libya and lack of any other viable alternative method of communications such as emails, as mentioned earlier.

According to Gray (2004) "Delivery and collection questionnaires are simply delivered by hand to each respondent and collected later". This has the advantage over postal questionnaires in that there is some direct contact with potential respondents that might in turn persuade a greater proportion of people to complete the questionnaire. One of the considerable disadvantages of this approach, obviously, is the time and effort of delivering and collecting the questionnaires.

Librarians were asked to complete questionnaires as accurately and objectively as possible. The completed questionnaires were returned about one month after distribution with a response rate of 100%. The reason for receiving such a high rate of responses was due to the distribution of the questionnaire personally by hand.

The second questionnaire was concerned with gathering data about information policies and strategies in particular organisations and institutions in Libya. 17 questionnaires were distributed to managers of information units or information departments through the assistance of librarians in some cases, and by hand in other cases, depending on the situation and the circumstances. From the 17 distributed questionnaires, 14 completed questionnaires were returned representing a response rate of 82%.

With regard to the user questionnaire, the number of library users and library visitors was collected from the library's records and the average number of daily users was calculated for each library in order to establish a representative sample of library users across all sectors. This approach was applied because most special libraries and information centres provide their services not only for employees within the organisation but also for users and visitors from outside the organisation. Therefore, it was necessary to take external users into account and to represent them in the sample for this research. The number of monthly users was calculated and divided by 30 to get the average number of daily users.

The number of monthly users and the average number of daily users in the various libraries and information centres are given in the following table.

Table 3.11: To illustrate monthly and daily users

Library Name	Number of monthly users	Average of daily users
Library Of The Great Man-Made River Project	480	16
Library Of The General People's Congress	690	23
Library Of The General People's Committee For High Education	810	27
Library Of Company Of Libya For Insurance	600	20
Library Of Central Bank Of Libya	720	24
Information Unit Of Jowef Oil Technology	750	25
The Central Library Of National Oil Corporation	750	25
The Scientific Library At The Arabian Gulf Company For Oil Exploration	900	30
The Legal Library	360	12
Library Of Misrata General Hospital	240	8
Library Of Advanced Centre For Administrative And Financial Occupation	900	30
Library Of Advanced Centre For Computer	1050	35
Library Of Management Institute	1200	40
Library Of Graduate Institute Of Medical Technique	1050	35
Library Of Libyan Jihad Centre For Historical Studies	1350	45
Economic Sciences Research Centre	840	28
Library And Research Centre For The Studies Of The Green Book	810	27
Total	13500	450

Table 3.12: To illustrate the average number of daily users and user categories

Library Name	Average number of daily users	Number of forms distributed	Users categories					
			Employees	Research workers	Under graduate students	Post graduate students	U.S members	Other
Library Of The Great Man-Made River Project	16	20	√	√	0	0	0	0
Library Of The General People's Congress	23	25	√	√	√	√	√	0
Library Of The General People's Committee For High Education	27	30	√	√	√	√	√	0
Library Of Company Of Libya For Insurance	20	25	√	√	0	0	0	0
Library Of Central Bank Of Libya	24	25	√	√	√	√	√	0
Information Unit Of Jowef Oil Technology	25	30	√	√	0	0	0	0
The Central Library Of National Oil Corporation	25	30	√	√	0	√	√	0
The Scientific Library At The Arabian Gulf Company For Oil	30	33	√	√	0	√	√	0
The Legal Library	12	15	√	√	0	√	√	0
Library Of Misrata General Hospital	8	14	√	√	√	√	√	√
Library Of Advanced Centre For Administrative	30	33	√	√	√	√	√	0
Library Of Advanced Centre For Computer	35	40	√	√	√	√	√	0
Library Of Management Institute	40	45	√	√	√	√	√	0
Library Of Graduate Institute Of Medical Technique	35	40	√	√	√	√	√	0
Library Of Libyan Jihad Centre For Historical Studies	45	50	√	√	√	√	√	√
Economic Sciences Research Centre	28	30	√	√	√	√	√	0
Library And Research Centre For The Studies Of The Green Book	27	30	√	√	√	√	√	√
Total	450	515						

Librarians were asked to distribute the questionnaires in a random way to a sample of library users. This was achieved by distributing questionnaires to users who visited the library for whatever reason, e.g. borrowing or return of library materials. The completed questionnaires were returned one month after distribution. 550 questionnaires were distributed from which 450 were returned. Out of 450 distributed questionnaires, 35 were discarded owing to incomplete or missing data. Fink (2003) defines missing data as incomplete information due to unanswered questions on the survey instrument or lost questionnaires. The response rate for completed questionnaires was 87%.

Table 3.13: To illustrate users response rates in all sectors

Sector	No. of organisations covered	No. of libraries surveyed	No. of forms distributed	No. of forms received	No. of forms completed	Response rate
Government departments	21	2	55	50	43	91%
Government organisations	13	1	30	25	16	83%
Financial companies	17	2	45	40	39	89%
Energy organisations	29	3	93	80	79	86%
Legal organisations	10	1	20	15	12	75%
Health libraries	13	1	14	10	8	71%
Highly specialised institutes	35	4	148	135	131	91%
Research and documentation centres	31	3	110	95	87	86%
Total	169	17	515	450	415	87%

3.13 Design and Prototyping

This was the second phase of this research and was based on the findings of the first phase. This stage involved the design of an appropriate digital library service to assist in developing current services. A quasi-experimental and system design approach was used for this phase of the research. In this stage one sector of special libraries in Libya was chosen based on the significance of its contribution to the economy of the state. The Libyan economy relies mainly on the revenues from the oil sector, which account for almost all of its export earnings and about 25 percent of its GDP.

The second phase of this research (design and prototyping) focused on developing a low cost digital library to suit the needs and requirements of special library users and to provide services that were most frequently required by selected users. The design was aimed at not only providing access to, or retrieval of, information, but rather to deliver electronic services to special library users. Based on the findings of the first phase, the research identified a number of special collections – printed and/or digital – that were of importance to users in special libraries, and a user-centered digital library was designed to meet their requirements.

The objectives of designing a low cost digital library were derived from the interviews which were conducted with managers of information units in various companies and enterprises in Libya as well as interviews with some librarians who were responsible for running special libraries in the country. The broad objectives of designing the proposed digital library were as follows:

- Developing the standard of services presented to end users to enhance the level of research activities within the organisation.
- Using and putting into practice modern ICT to improve the current level of services and to solve the problems that the central library at the National Oil Corporation faces.
- Producing a design for a low cost digital library that provides not only access to, and retrieval of, information, but also the services that are most frequently required by the users.

It is always important to define terms, so it would be meaningful to start first with the definition of the word system. It is important to define this term because digital libraries are often considered as a system which according to Buchanan (2006) “is set of logically related components (software, hardware, processes, people, data etc.) brought together to

accomplish a predefined organisational goal which, in online systems, is achieved primarily through the processing of information".

3.13.1 The Systems Development Life Cycle (SDLC)

There is a general agreement that there is no standard method for designing a digital library. Guidelines published by IFLA (2005) for designing and building integrated library systems indicate that "Although there are many methodologies that address a project's lifecycle, the following four phases are generally accepted as standard: envisioning, planning, developing, and deploying or stabilizing".

From the library's perspective, the scope of the project is not a methodology but rather a definitive statement as to what the digital library is intended to do – what services it will offer to its users and what functions it will perform. Buchanan (2006) states that the standard development lifecycle (SDLC) provides the common methodology and high-level operational guidelines within which software is developed and maintained. According to Dennis (2000) the SDLC is the process of understanding how an information system can support business needs, designing the system, building it, and delivering to users.

The SDLC typically consists of four fundamental phases: planning, analysis, design, and implementation as demonstrated in figure 3.3. Each phase is itself composed of a series of steps. The discussion below looks at each of these stages in the context of the development of a digital library.

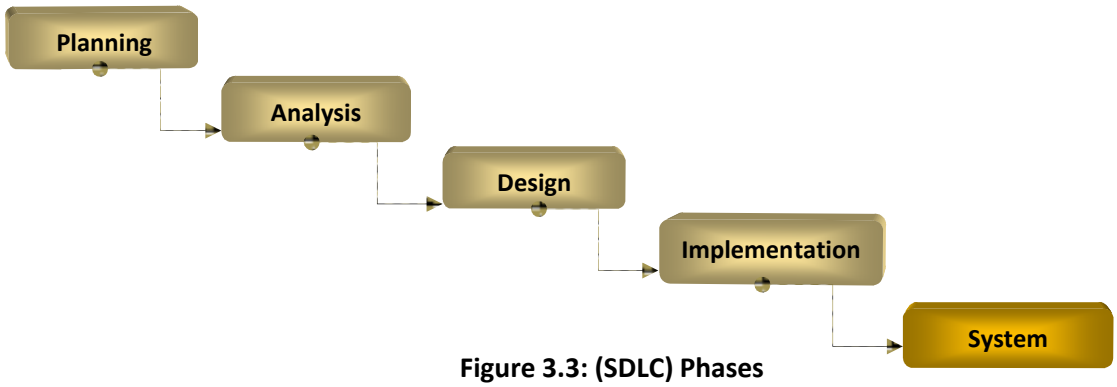


Figure 3.3: (SDLC) Phases

3.13.1.1 Planning Phase

The planning phase is considered a fundamental process of understanding why a digital library should be built and determining how it should be built. This process results in a vision document, which outlines the rationale for the project, the expected outcomes, the project's feasibility, goals and constraints, opportunities and risks, and the structure of the project.

Questions examining economic, technical, and organisational feasibility should be answered at this stage e.g.

- What exactly is the project? Is it possible? Is it feasible? Can it be done?
- If we build a digital library, will it be used?
- Economic feasibility: Are the benefits greater than the costs? If benefits outweigh costs, then the decision is made to design the library.
- Technical feasibility: Do we have the technology? If not, can we get it? What is the current scenario of ICT within the organisation?

The aforementioned questions were answered at this stage to determine the expected value of designing a digital library service.

The questionnaire which was distributed in the first phase of this research to gather information pertaining to information resources and services assisted the researcher in identifying how users would prefer to use these resources as well as understanding the implications for metadata and the requirements for designing the digital library

Data gathered from the questionnaire helped to identify the most required and frequently used resources, problems, etc. The output was a list of the most frequently used resources and services as well knowledge as to how the new system should operate, in terms of the hardware, software, and available infrastructure. Identifying the frequently used resources and their formats, e.g. hard copy or electronic form, was the focus of the user questionnaire. Internal resources, which consist of reports and publications created by employees within selected organisations, were also specified to assist in building the digital library in the most effective way.

3.13.1.2 Analysis

The analysis phase answers the questions of who will use the system, what the system will do, and where and when it will be used (Dennis, 2000). During this stage the researcher (developer) should investigate the current situation, identify improvement opportunities, and develop a concept for the new digital library (system). The next step is information gathering through interviews. The analysis of this information in conjunction with input from the data gathered in the first phase led to the development of a concept for the new system.

Three semi-structured interviews were conducted to gather information related to ICT infrastructure, currently used IT applications, and information resources and services in the

central library of the National Oil Corporation (NOC). The first interview was conducted with the information unit manager in the (NOC) and the second interview was conducted with the librarian responsible for running the central library of the NOC. The third interview was conducted with the system support manager in the same organisation.

These semi-structured interviews assisted in creating the digital library and getting the aforementioned questions answered. The intention of these interviews was to identify and list the most needed and frequently used resources, most common problems, etc. In addition to this, it was possible to recognise how users would prefer to use these resources, and what approach was currently being used for the retrieval of information resources. From this it was possible to establish the metadata and requirements needed for designing a digital library.

The interviews also focused on identifying the format of these resources or documents, whether these resources were in hard copy or in electronic form, and whether they were internal resources (i.e. reports and publications created by employees within the targeted organisation). External resources were also identified as were the means used for acquiring these resources. The interviews assisted the developer in creating the proposed digital library in an effective way as many key questions were answered at this stage as discussed in chapter 6.

3.13.1.3 Design

Once the analysis was concluded the researcher was able to start designing the new system (digital library). The design phase decides how the system will operate, in terms of the hardware, software, and available infrastructure. The first step in the design phase was to develop the design strategy, i.e. whether the system would be built by using commercial digital library software or would be developed using freely available digital library software. This led to the development of the basic architectural design for the system that described the hardware, software, and network infrastructure that would be used.

The question as to which software package to use was driven by the present state of special library funding. Due to financial constraints special libraries in Libya are not in a position to use commercial software for the development of new systems. Therefore, freely available software was used for developing the digital library.

3.13.1.4 Implementation

The final phase in the (SDLC) is the implementation phase, during which the system is actually built. Dennis (2000) states that this stage usually gets the most attention because, for most systems, it is the longest and most expensive single part of the development process. The first step in implementation is system construction, during which the system is built and tested to ensure it performs as designed. After designing the proposed digital library the prototype, which was designed for the NOC, was tested to ensure that it performed as designed. Chapter 7 incorporates further description about the evaluation of the prototype digital library.

3.13.2 Design Options

According to Dennis (2000) "there are many different systems development methodologies, and each one is unique because of its emphasis on processes versus data and the order and focus it places on each (SDLC) phase". Structured design is the first main type of systems development methodology, and rapid application development is the second major methodology.

Structured design includes waterfall development in which each phase is completed before moving on to the next phase, with formal reviews happening in between (Buchanan, 2006). The second type of structured design is called parallel development in which instead of doing the design and implementation in sequence, a general design is produced for the whole system and it is then divided into a series of distinct subprojects that can be designed and implemented in parallel. Once all the subprojects are completed, there is a final integration of the separates pieces and the system is delivered (Dennis, 2006). The primary advantage of this methodology is that it can reduce the schedule time required to deliver a system. The drawback of this approach lies in the fact that the subprojects are not completely independent; design decisions made in one subproject may affect another and the end of the project may require significant integrative efforts.

Rapid application development is the second type of systems development methodology. It emerged in the 1990s and attempts to address the weakness of the structured development methodologies. It includes the phased or staged development approach and the prototyping methodology. The phased methodology "is a process whereby the application is delivered in stages, typically in order of functional priority. Standard design processes are followed until

functional or technical specifications are complete for the application (Buchanan, 2006). Figure 3.4 demonstrates the phased or staged methodology.

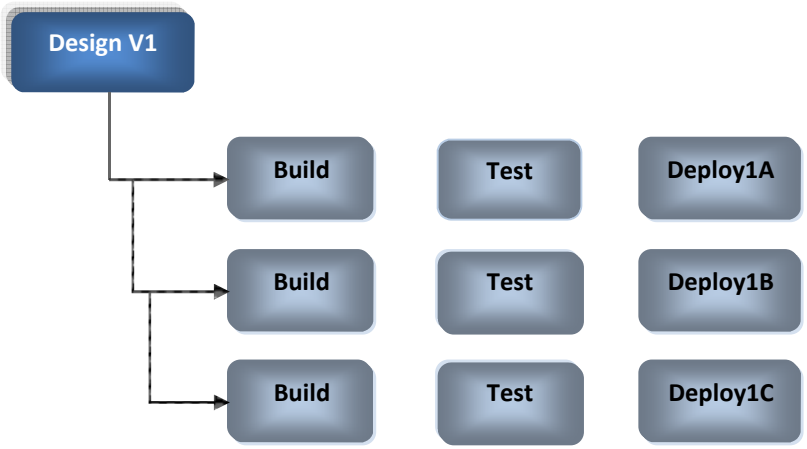


Figure 3.4: Staged methodology

(Source: Buchanan, 2006)

The major drawback to phased development is that users begin to work with systems that are intentionally incomplete.

The prototyping methodology performs the analysis, design, and implementation phases concurrently, and all three phases are performed repeatedly in a cycle until the system is completed. With this approach the basics of analysis and design are performed, and work immediately begins on a system prototype. The first prototype is usually the first part of the system that the users will use. This prototyping approach was adopted for designing the proposed digital library because the key advantage of prototyping is that it very quickly provides a system for the users to interact with, even if it is not ready for widespread organisational use at first. Adopting this approach was an important issue for this research as the prototype digital library had to be evaluated by target users to get feedback on its functionality before its final installation and usage by the users in the NOC. Figure 3.5 demonstrates the prototype methodology.

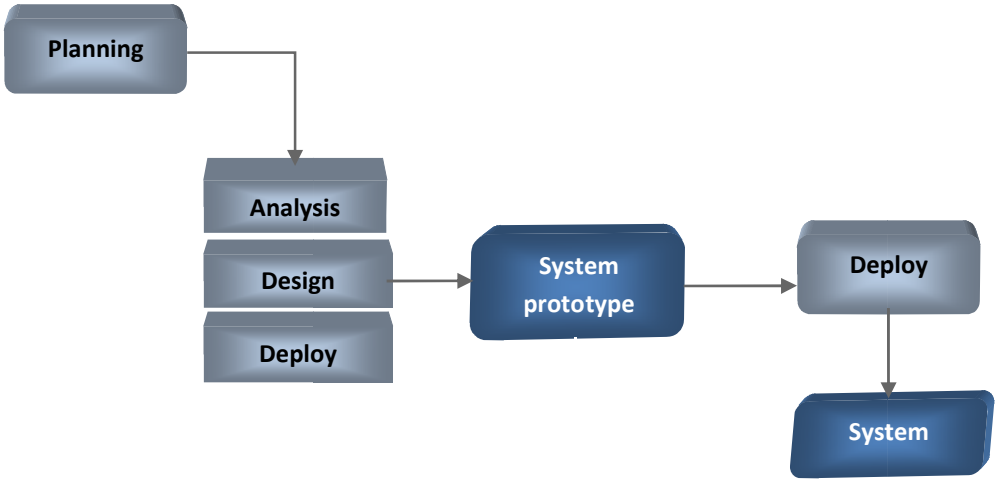


Figure 3.5: Prototyping methodology

(Source: Dennis, 2000)

3.13.3 Design Flow Diagram

Designing a digital library usually comprises several phases (Dawson, 2009). These phases are shown in figure 3.6 which depicts the design flow diagram.

Each phase consists of a number of stages, each stage is subdivided into steps and each step contains a series of tasks. Thus the total work is broken down into manageable portions. The stages and steps carried out in designing the NOC digital library are described in details in chapter 6.

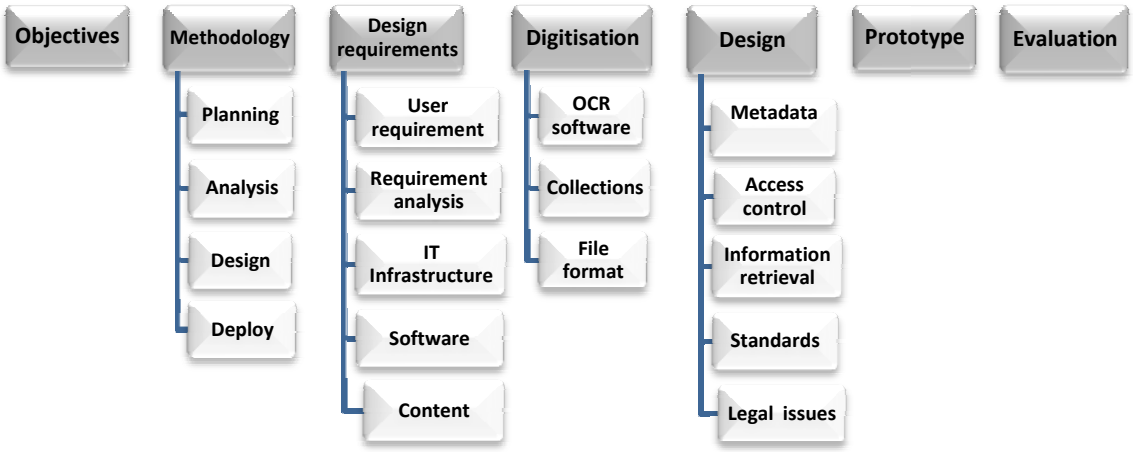


Figure 3.6: Design flow diagram

3.13.4 Navigation Design

The navigation component of the interface allows users to enter commands to navigate through the digital library and perform actions to review information which it contains. The navigation component also presents messages to the users about the success or failure of his or her actions. According to Dennis (2000) the goal of a navigation system is to make the system as simple as possible to use.

The Greenstone digital library software has a built-in interface which enables users to navigate through the digital library. Despite the fact that Greenstone has its unique navigation components, it was necessary to customise the interface of the NOC digital library in accordance with user needs and requirements. In particular there was a need to customise the interface to support Arabic and English languages in addition to adding features such as front page design, header for the digital library, collection icon, cover images, and interface look and feel.

3.13.5 Greenstone Digital Library Software

There was variety of software available for the creation of the proposed digital library. Because the basic principle of the design depended on the design of an inexpensive digital library, selection was a complicated question. This step was very important to reduce the cost of the design and to keep it to a minimum. What is more, due to the availability of a variety of open source software that could serve the purpose of designing the proposed library, such as Dspace, Fedore, etc., the selection of appropriate software for building the digital library was not a simple issue. Greenstone software was selected due to its good reputation and support for different languages which was an essential aspect in the context of bilingual content. Producing a design for a bilingual digital library that supported Arabic and English languages was a crucial aspect because:

- English is the second most used language in Libya.
- Almost all literature written in any branch of knowledge is published in English.
- A considerable number of research workers especially in the sector of energy in national and foreign companies in Libya are non-Arabic speakers.
- A substantial number of Libyan research workers are acquainted with the English language.

3.13.5.1 Evaluating Greenstone

Before adopting Greenstone software for designing the proposed digital library, the software was evaluated in terms of the following criteria (Maila, 2008):

- System requirements and system support
  - Flexibility: Support for various formats
  - Installation support
  - Frequency of version updates

Greenstone software supports various formats and can run on different operating systems such as Windows, Linux, UNIX, and Mac. This is important as special libraries in Libya use different operating systems. Therefore, there was a need to adopt software that could support various operating systems. The system also provides detailed documentation for each of the systems it supports. The details can be found on the Greenstone wiki. There are also constant updates for the software, which can be found on the Source Forge website (Witten, I., 2008).

- Design and usability
  - Simplicity and use of the software
  - How configurable is the software?
  - How well are the support/help features and services implemented?
  - Are the extra features sufficient: handles multilingual interface, high-speed search, multiple output formats?
  - Accessibility of the software

As regards accessibility, Greenstone is open source software. The software is a highly customisable one. Documentation about how to customise the Greenstone interface can be found on the Greenstone wiki. As regards simplicity, retrieved documents appear on the first screen in a simple and customisable format. Greenstone is one of the leading applications in this domain and can handle documents in multiple languages. Greenstone is also capable of displaying the user interface in multiple languages and handling collections consisting of text, pictures, audio, and video (Witten, I., 2008).

- Search and retrieval features
  - Search simplicity
  - Advanced search features
  - Ease of use: Powerful, easy to use search engine

- Information organisation
- Browsing features

Greenstone is customisable for simple search and advanced search, and the software is powerful. A large number of digital libraries in the world have been designed using Greenstone software because the software is easy to use and has a powerful search engine. As regards information organisation, Greenstone is also capable of organising collections and has powerful browsing facilities.

- Interoperability

Greenstone is highly interoperable software. It incorporates a server that can serve any collection over the Open Archives Protocol for Metadata Harvesting (OAI-PMH), and Greenstone can harvest documents over OAI-PMH and include them in a collection.

3.13.5.2 Testing Greenstone

The objective of this test was to ensure that each element of the application met the functional requirements required for the proposed digital library. The first phase of testing was carried out to assure the systems installation and support group, prior to implementing the system. The second phase of testing was carried out to prove that all components of the system interfaced with each other correctly and that there were no gaps in the data flow. The third phase of testing was carried out to insure that the system provided acceptable response times for retrieval of information. In this test, some documents were retrieved from the system and the response time proved encouraging (1 to 2 seconds). Greenstone has two separate interfaces, the librarian interface and the user interface. Both interfaces were tested to make sure that the system runs as it should be.

3.14 Evaluation of NOC Prototype Digital Library

This was the third phase of this research and incorporated the evaluation of the prototype digital library which was designed in the second phase of this research to enhance the services provided by the central library of the National Oil Corporation.

When a digital library is created, an evaluation of the prototype digital library is necessary as it leads to the full design. This is no different from any other integrated system which should be tested to explore its functionality. According to Rubin, (2008) usability testing refers to a process that employs people as testing participants who are representative of the target audience in order to evaluate the degree to which a product meets specific usability criteria.

This phase comprised the evaluation of a prototype digital library and represented the last stage in designing the digital library. Evaluation of the prototype digital library was an important part of developing the NOC digital library. Different approaches have been used for different goals by digital library developers such as: system-centred, human-centred, sociological, economic, and usability-centred (Solis, 2005). Buchanan (2009) states that usability and usefulness can be readily combined, and that questionnaire and observation are valid multi-method approaches. For the NOC digital library a usability–centred approach was applied to assess user perceptions as to the ease of use of the prototype digital library. Usability in this context is about choosing useful functionalities. Usable means useful, easy to use, and appreciated by users. The evaluation of the prototype digital library was aimed at discovering the following:

- Ease of use.
- Quality of user experiences
- User satisfaction
- Necessary changes

The objective of this phase was to assist in answering the following questions:

- What are the problems facing library patrons in using the designed system?
- To what extent was the designed library efficient in assisting users to get the most of the new digital library?
- To what extent was the user interface successful in assisting library users in finding and discovering selected resources in the most convenient way?
- To what extent were browsing and search facilities suitable for end users? Was there any need to modify these facilities to meet user needs and requirements?

- To what extent were documents enriched by metadata? Should new metadata elements be implemented to suit user needs?

3.14.1 Evaluation Instrument

A survey questionnaire was used as the primary method of getting user feedback during the experiments and a Likert scale was used to measure usability criteria and participants were asked to evaluate the prototype digital library. This was the main method used to elicit their opinion during the experiment.

In order to design an effective questionnaire, the same guidelines in 3.5.1 were applied to this questionnaire. The questionnaire was assessed in terms of its layout design, wording of questions, and some modifications were made as a result.

3.14.2 Evaluation Participants

According to the labour force statistics for the oil and gas sector issued by the Manpower Planning Department in Libya in September 2007, the number of employees and workers at the National Oil Corporation totalled 908 people. In order to have a manageable sample of special library users, a small sample from the total number of employees was selected (5%) and the questionnaire was then distributed to 40 employees and research workers in the organisation. In addition to that 6 questionnaires were distributed to managers and systems people in the corporation. According to Nielsen (2003) “in this type of surveys on usability, from the fifth user on, most of the usability problems that may be found in an information system are already identified. From then on, the results present little variability”. A small sample of users was used as it was recognised that the evaluation process would require volunteers to use the prototype digital library for a period of time and that a large sample would involve diverting a considerable amount of resource from core activities.

3.14.3 Evaluation Method

Evaluation is the systematic process of determining the merit, value and worth of something. An evaluation method is a series of steps or actions taken to accomplish an evaluation. Saracevic (2004) states that “the range of methods used in digital library evaluations is wide. It would be hard to find a scholarly evaluation method that was not used”. A number of evaluation studies have involved several methods. Ingrid Hsieh-Yee (2005) identifies the following methods:

- Surveys, including direct questionnaires and online surveys

- Structured interviews
- Focus groups
- Observations
- Task accomplishment
- Case studies
- Experimentation
- Records analysis
- Usage analysis

Saracevic (2004) states that digital libraries are complex entities and therefore many methods are appropriate: “Each method has, by definition, certain strengths and weaknesses. There is no one best method and there never will be one”. The evaluation method applied for this task consisted of a questionnaire survey for gathering the data for the evaluation of the digital library. Questionnaires were used as the primary method of getting user feedback during the experiments. Check–box questions were used in this questionnaire and a Likert scale was also used to measure usability criteria.

3.14.4 Survey Procedures

A number of questionnaires were distributed to a sample of employees and research workers within the National Oil Corporation in different departments and administrative units. In addition, a number of questionnaires were distributed to managers and systems people in different locations of the same organisation. The mechanism used for selecting the sample of special library users is described below.

Questionnaires were distributed by hand to National Oil Corporation employees. The researcher had visited the central library of the NOC for three consecutive days. During these three days volunteers were asked to participate in the evaluation study. In the test, volunteers were requested to search freely the prototype digital library for a period of between 15 and 20 minutes and then to answer the three sets of questions. It was assumed that through this exercise, the participants got a general understanding of this library.

Each participant session lasted between 15 to 20 minutes, depending on the time taken to complete the assigned tasks (searching the prototype digital library) and the time taken by the participant to complete the questionnaire. Each session consisted of the following steps:

- The participants were given a short overview of what the experiment would entail. I also explained my role in this experiment i.e. to observe participant interaction with the library, to provide participants with technical support.
- Participants were given a chance to familiarise themselves with the digital library. Participants could ask questions or ask for general assistance at any time during the session.
- After completing the search, the participant was asked to complete the questionnaire.

Because the test took place in the central library of the National Oil Corporation, permission from management at the NOC has to be obtained before planning the sessions. The researcher explained the study to participants and answered any questions before the session.

From the 46 questionnaires which were distributed to NOC library users, 38 questionnaires were completed representing a valid response rate of 83%. As this figure is acceptable in research and academic studies, such as the Sage Encyclopaedia of Survey Research Methods (2008), Encyclopaedia of Case Study Research (2010) and the Sage Encyclopaedia of Qualitative Research Methods (2008) the figure was judged to be acceptable and gave a good indication regarding the effectiveness of the design of the prototype digital library. 96% of distributed questionnaires to managers and systems people were returned complete.

3.14.5 Likert Scales

The Likert scales technique presents a set of attitude statements (Babbie, 2005). According to the Sage dictionary of social research methods (2006), a Likert scale is a summated rating scale used for measuring attitudes. Likert scales present users with a statement and they are asked to register their level of agreement or disagreement with the statement. Participants were asked to express agreement or disagreement on a five-point scale. A five-point scale was preferred to seven or nine point scales as it made the analysis of participant opinion simpler and allowed trends in the results to be more easily identified. Each degree of agreement is given a numerical value from one to five where a higher value corresponds to more familiarity. A total numerical value can be calculated from all the responses received. Figure 3.7 depicts Likert scale taken from user questionnaire.

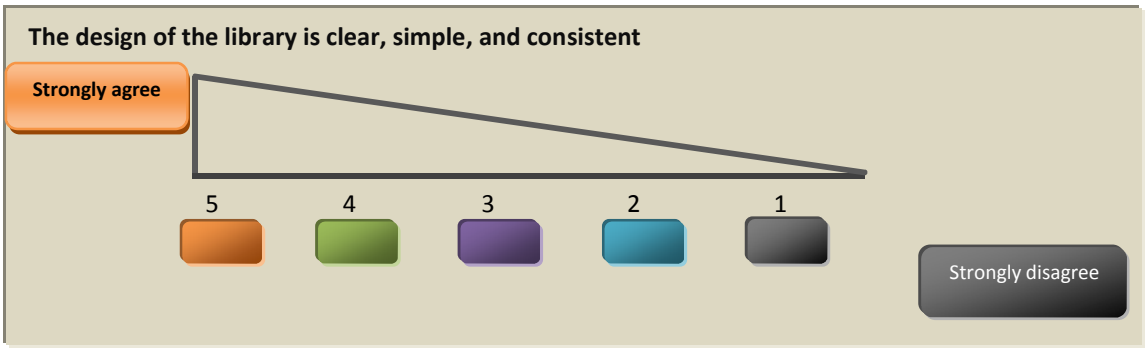


Figure 3.7: Likert scale taken from user questionnaire

3.14.6 Administering the Scale

In order to capture the perceptions of respondents with respect to the features that they evaluated each question required the respondent to rate each feature on a response scale. For instance, they could rate each item on a 1 to 5 response scale where in the first question:

1. = very poor
2. = poor
3. = barely acceptable
4. = good
5. = very good

And in the second question

1. = strongly disagree
2. = disagree
3. = undecided
4. = agree
5. = strongly agree

3.15 Summary

This chapter has presented a detailed description of the research design and methodology used in this research. It has highlighted the way of conducting the survey and the approach used to achieve the goals of the first phase of this research. It has described the tools used for gathering the required data. A number of research methods were used in this research to achieve the goals for each stage. This chapter has highlighted the way in which the survey was conducted and the approach implemented for designing the proposed digital library in the second stage of this research. It has also explained the method used for evaluating the digital library which was built using Greenstone software. It also sheds light on the questionnaires which were distributed to a sample set of selected libraries and a sample of special library users in Libya. Different research methods and research strategies were used in this thesis to achieve the goals of each phase of this research. The following chapter presents the analysis of the data which were gathered from the questionnaires distributed to a sample of special library users and a sample of librarians who are responsible for running the sample of special libraries and information centres in Libya.

CHAPTER 4: DATA PRESENTATION

4.1 Analysis of Librarian Questionnaire

The previous chapter presented the methodology applied for this research. This chapter presents the anaylisis of the data which were gathered from the questionnaires distributed to a sample of special library users and a sample of librarians who are responsiple for running the sample of special libraries and information centres in Libya. This chapter is divided into three sections. The first section provides the analysis of the librarian questionnaire. The second part provides the analysis of the management questionnaire and the last one provides the analysis of the uer questionnaire.

4.1.1 Unit Title

Librarians were asked to state whether their place of work was called a special library, information centre or information unit. Figure 4.1 illustrates the replies received, with more than half of respondents using the term library and the rest using the term information centre or information unit. Librarians also were asked how many libraries or information centres their organisations had. Fifteen of the seventeen libraries and information centres (88%) replied that there was only one library. Two libraries reported that there were two other libraries in regional offices.

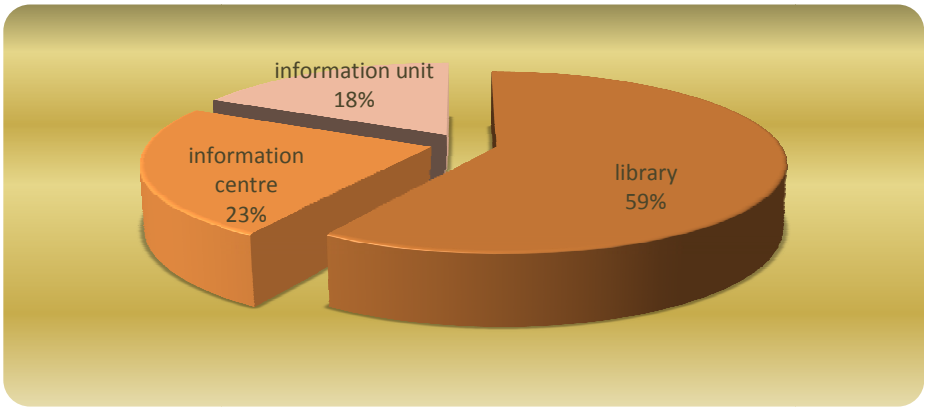


Fig. 4. 1: Title of library/ information unit

4.1.2 Categories of Users

Librarians were asked which departments of the organisation the library or information centre aimed to serve. Table 4.1 and Fig 4.2 summarise their responses. All of the libraries (100%) aimed to serve all employees and research workers across the organisation. 11 libraries (65%) aimed to serve employees and special categories

of external users, and two libraries (12%) aimed to serve the general public as well as employees.

Table 4.1: Categories of library users

Library name	User categories					
	Employees	Research workers	Under graduate students	Post graduate students	University staff members	Other
Library of the great Man-Made River Project	√	√	x	√	√	x
Library of the General People's Congress	√	√	√	√	√	x
Library of the General People's Committee for Higher Education	√	√	√	√	√	x
Library of Company of Libya for Insurance	√	√	x	x	x	x
Library of Central Bank of Libya	√	√	√	√	√	x
Information unit of Jowef Oil Technology	√	√	x	x	x	x
The Central Library of the National Oil Corporation	√	√	x	√	x	x
The Scientific Library at the Arabian Gulf Company for Oil Exploration	√	√	x	√	x	x
The Legal Library	√	√	x	√	√	x
Library of Misrata General Hospital	√	√	√	√	√	x
Library of the Advanced Centre for Administrative and Financial Occupation	√	√	√	√	√	x
Library of Advanced Centre for Computers	√	√	√	√	√	x
Library of Management Institute	√	√	√	√	√	x
Library of Graduate Institute of Medical Technique	√	√	√	√	√	x
Library of Libyan Jihad Centre for Historical Studies	√	√	√	√	√	√
Economic Sciences Research Centre	√	√	√	√	√	x
Library and Research Centre for the Studies of the Green Book	√	√	√	√	√	√

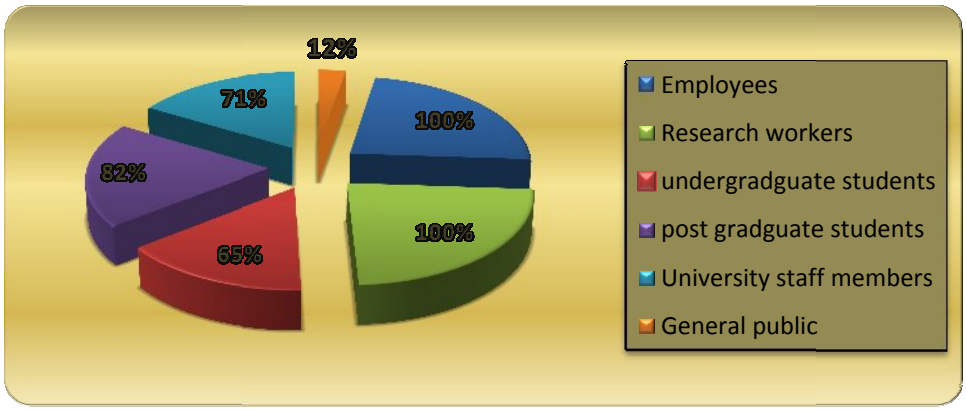


Fig.4.2: Categories of users served

4.1.3 Target Users

Librarians were asked to estimate the size of the potential user base for their library or information centre. (The number that could in theory use the service) Responses to this question showed that the number which libraries are designed to serve ranged from 400 to 1600 users as shown in Fig.4.3

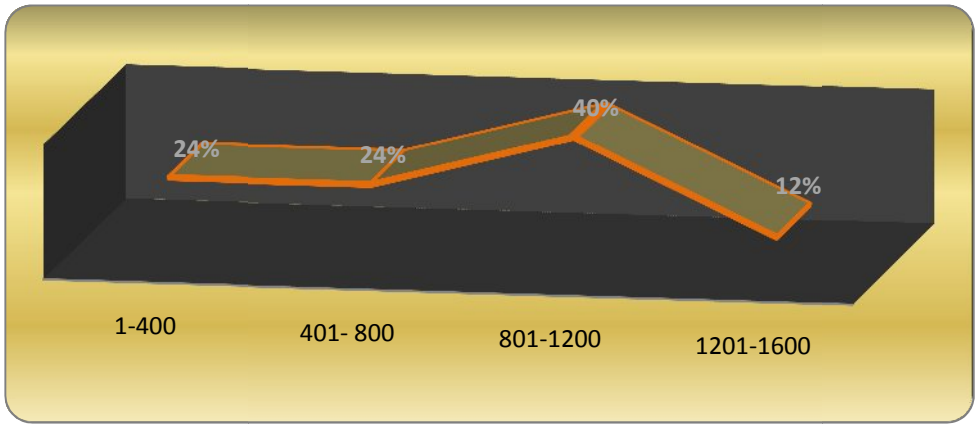


Fig.4.3: Potential number of users

4.1.4 Days and Hours of Operation

Table 4.2 below summarises the days and hours of operation in the sample of special libraries and information centres in Libya.

Table 4.2: Days and hours of operation

Library name	Morning shift	Afternoon shift	Closing days
Library of the Great Man-Made River Project	8.00 – 14.00	15.00 – 17.00	Friday and public holidays
Library of the General People's Congress	9.00 – 15.00	closed	Friday and public holidays
Library of the General People's Committee for Higher Education	9.00 - 15.00	closed	Friday and public holidays
Library of Company of Libya for Insurance	7.30 – 14.30	closed	Friday, Saturday and public holidays
Library of Central Bank of Libya	8.00 – 15.00	closed	Friday, Saturday and public holidays
Information Unit of Jowef Oil Technology	8.00 – 12.00	13.00 – 17.00	Friday, Saturday and public holidays
The Central Library of National Oil Corporation	8.00 – 15.00	closed	Friday and public holidays
The Scientific Library at the Arabian Gulf Company for Oil Exploration	9.00 - 15.00	closed	Friday, Saturday and public holidays
The Legal Library	9.00 – 14.00	closed	Friday, Saturday and public holidays
Library of Misrata General Hospital	8.00 – 12.00	13.00 – 18.00	public holidays
Library of the Advanced Centre for Administrative and Financial Occupation	8.00 – 14.00	closed	Friday, Saturday and public holidays
Library of Advanced Centre for Computers	9.00 – 15.00	16.00 – 18.00	Friday, Saturday and public holidays
Library of Management Institute	8.00 – 12.00	13.00 – 15.00	Friday, Saturday and public holidays
Library of Graduate Institute of Medical Techniques	8.00 – 12.00	13.00- 18.00	Friday, Saturday and public holidays
Library of Libyan Jihad Centre for Historical Studies	8.00 – 14.00	15.00 – 20.00	Friday, Saturday and public holidays
Economic Sciences Research Centre	9.00 – 12.00	13.00 -16.00	Friday, Saturday and public holidays
Library and Research Centre for the Studies of the Green Book	8.00 -12.00	13.00- 19.00	Friday and public holidays

Table 4.2 demonstrates that opening hours and working days varied considerably amongst the libraries and information centres. Opening hours ranged from between 6 hours and 9 hours and depended on the regular working days of the parent institution.

4.1.5 Staffing

Managers were asked to indicate their qualifications and the type of degree they held, stating whether they held an information or library science degree or a qualification in a subject relevant to the work of the organisation in addition to a LIS qualification. Table 4.3 below summarises the qualifications of managers.

Table 4.3: Managers qualifications

Qualifications	Number
Library and information science qualification	**9**
Qualification in subject relevant to the work of the organisation	**6**
Qualification in subject not relevant to the work of the organisation	**2**

The responses revealed that nine out of the 17 libraries were managed by someone with a library and information science qualification. Six libraries (35%) were managed by someone with a qualification relevant to the work of the organisation and two libraries (12%) were managed by someone with a qualification in a subject not relevant to the work of the organisation. The responses indicated that almost half 50% of the selected libraries were managed by someone without a library and information qualification. It is important to point out in this context that in the UK and in some European countries the normal route is a degree in any subject then postgradguate in LIS, whereas in Libya the normal route is a degree in LIS. Therefore, there is scarcity of librarians with a subject qualification who might specialise in specific subjects in addition to postgraduate LIS. This category of librarians are usually able to analyse documents and create the necessary subject headings that are needed for cataloguing, indexing and abstracting services in addition to their ability to provide highly rated services for end users.

4.1.6 Staff Numbers

Respondents were asked to provide details regarding the nationality, gender, number and qualifications of library staff.

Table 4.4 and figure 4.4 demonstrate the number of library staff in the sample of special libraries and information centres. It can be seen that there is only a very slight difference between the number of males and females employed in the sector. Most of the staff are Libyan (95%) with a small number of Arab workers from other countries (5%). There are no foreign librarians in the sector, which underlines the importance of the availability of graduates from the Departments of Library and Information Sciences which some of them were established 20 years ago at certain Libyan universities.

Table 4.4: The number, gender, and nationality of the library staff

Nationality	Gender	Number	Gender	Number
Libyan	Male	42	Female	45
Arab	Male	3	Female	2
Other	Male	0	Female	0
Total	Male	45	Female	47

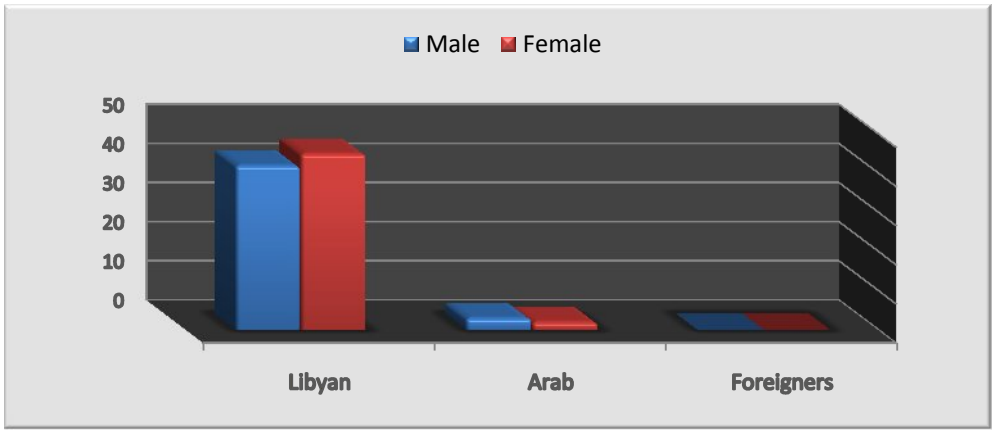


Fig.4.4: Numbers, nationality, and gender of library staff

Figure 4.5 and table 4.5 demonstrate the following:

- All libraries in the sample employed qualified librarians who have majored in the field of library and information sciences. However, the number of library staff with library and information sciences qualifications was only 45% of the total staff. In addition, only 53% of

libraries or information centres in the sample were managed by someone with a library and information science qualification, which is a matter of potential concern.

- There is a clear shortage of subject specialists in the sample across all sectors despite the importance of the role played by this category of worker in information centres and special libraries. Only 17% of the managers were subject specialists, which cannot be considered a good indicator owing to the role those in this category have to play nowadays in providing a high standard of services to end-users.

Thirty eight percent of library staff in the selected sample did not hold a qualification in a subject relevant to the organisation and did not have library and information science qualifications. As special libraries are supposed to serve as centres of specialised information in organisations this figure is of concern. With regard to staffing levels in the sample of libraries and information centres, respondents were asked whether they considered the number of current staff to be sufficient or insufficient. Responses to this question are given below.

Table 4.5: Staff qualifications according to sector

No	Sectors	Library and information science qualification	Relevant subject qualification	Not relevant subject qualification
1	Government departments	4	0	6
2	Government organisations	4	1	1
3	Commercial and financial companies	6	4	2
4	Energy organisations	4	3	9
5	Legal organisations	2	0	2
6	Health libraries	1	1	0
7	Highly-specialised instituts	8	2	11
8	Research and documentation centres	13	5	4
	Total	42	16	35

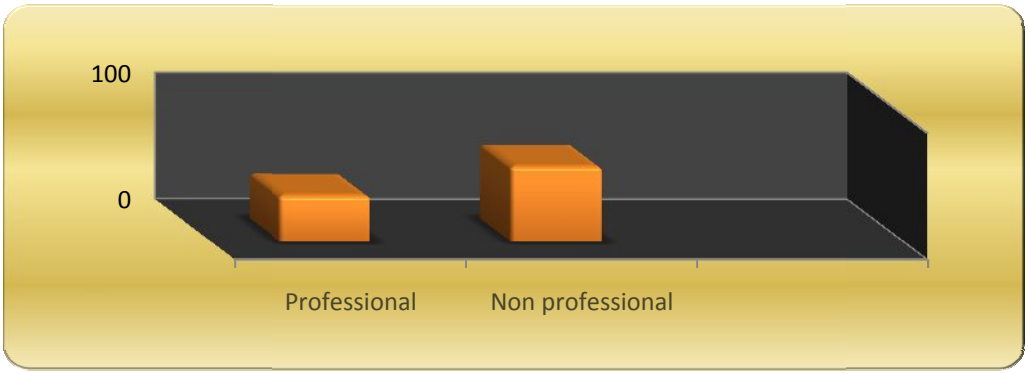


Fig. 4.5: Professional and non-professional staff

Table 4.6: Staffing levels

Library name	Insufficient Staff	Sufficient staff	Shortage of staff and type of qualification required		
			Qualification in library sciences	Subject specialists	Management qualification
Library of the great Man-Made River Project	√	×	0	2	1
Library of the General People's Congress	√	×	1	1	0
Library of the General People's Committee for Higher Education	√	×	1	1	0
Library of Company of Libya for Insurance	×	√	0	0	0
Library of Central Bank of Libya	√	×	1	2	1
Information Unit of Jowef Oil Technology	√	×	2	2	1
The Central Library of the National Oil Corporation	√	×	1	2	0
The Scientific Library at the Arabian Gulf Company for Oil Exploration	√	x	3	2	1
The Legal Library	x	√	0	0	0
Library of Misrata General Hospital	×	√	0	0	0
Library of the Advanced Centre for Administrative and Financial Occupations	×	√	0	0	0
Library of the Advanced Centre for Computers	×	√	0	0	0
Library of Management Institute	×	√	0	0	0
Library of Graduate Institute of Medical Techniques	√	×	2	2	×
Library of Libyan Jihad Centre for Historical Studies	√	×	2	1	×
Economic Sciences Research Centre	×	√	0	0	0
Library and Research Centre for the Studies of the Green Book	x	√	0	0	0
Total	9	8	13	15	4
Percent	53%	47%	41%	47%	12%

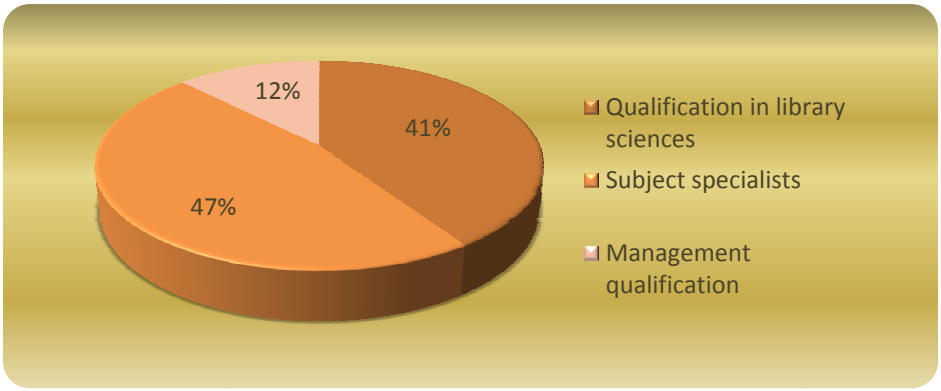


Fig. 4.6: Type of staff required

Figure 4.6 above demonstrates that just under (50%) of the selected libraries were satisfied with the number of staff. The rest of the libraries and information centres reported suffering from a shortage of qualified staff. Forty one % of the sample of libraries and information centres required staff with a qualification in library and information sciences while 47% required subject specialists and 12% required a management qualification. Only two libraries in the selected sample considered that they had more than enough staff and almost half (47%) considered their staff numbers to be adequate.

Respondents were asked to indicate their level of competency with respect to ITand systems such as online cataloguing, database design, internet, intranet, E- conferencing and virtual desk services.

Table 4.7 Summary of responses

Table 4.7: Information technology and systems and skilled staff

Applications	Highly competent	Competent	Low competence
Internet	4	10	78
Intranet	3	7	82
Database design	1	2	90
E-Conferencing	0	0	92
Virtual reference desks	0	0	92
Programming	1	1	90
Online cataloguing	2	2	88

Responses to this question show that most special library personnel do not currently have the skills to exploit an appropriate range of ITand systems. It can be seen that all staff have low competence with respect to virtual reference desks and e-conferencing. This might be due to the lack of need for such applications as well as a shortage of training courses in this domain. With regard to technologies such as the internet and intranets the situation is better as a fair proportion of special library staff were capable of dealing with and using such applications.

There were only 33 librarians who were competent or highly competent in the selected technologies and systems. This represents 35% percent of total staff, and indicates that there is a scarcity of skilled librarians who are able to take the lead in providing appropriate services to targeted clients in a changing electronic environment in which the production of scientific and technical literature is increasing.

The table also shows that a high proportion of librarians were not proficient in programming and online cataloguing. The overall picture of staff capability in using information technology and its applications reveals that library staff have not improved their capability after more than four decades in the establishments of some of these institutions. The tables and figures above highlight the need for training courses and the importance of developing the skills required by special library staff. However, library staff in some special libraries had attended courses in order to acquire relevant skills. Managers of the selected sample confirmed that most of the training courses and workshops especially designed by their organisations for library staff were related to the use of computers and the introduction of automation. Librarians have also participated in training courses on using automated systems in libraries such as MIN-ISIS and CDS/ISIS, as well as English language learning and training courses.

4.1.7 Collections

Librarians were asked to estimate the size of their stock to the best of their ability. Fig. 4.7 summarises the responses received from 17 libraries and information centres and shows that the number of books ranged from 500 to 15000.

Tables 4.8, 4.9, and 4.10 below depict that:

- All libraries acquire a variety of information resources, but there were noticeable differences in the quantities of available materials.
- There were 151,408 different Arabic titles, comprising 71% of the total number of books in the sample of libraries and information centres.

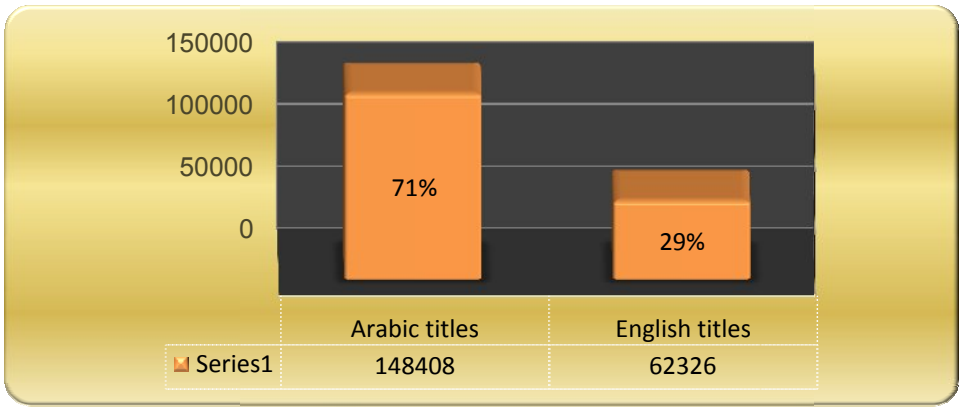


Fig.4.7: Arabic and English titles

- There were 62,326 English titles which represented 29% of the total number of books held by the sample.
- Theses and dissertations in the sample of libraries and information centres accounted for 1% of the total resources.
- Microfiche and microfilm made up 6% of the total material in the selected sample.
- Periodicals accounted for 1% of the total resources, which is a very low percentage considering their significance for scientific research work and work requirements in general.

The main reasons for the shortage of scientific journals highlighted by managers in the interviews were funding problems and financial constraints.

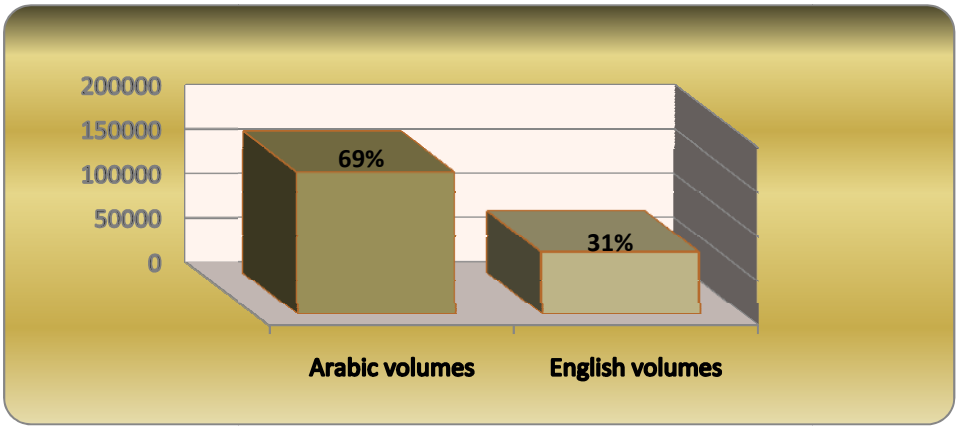


Fig.4.8: Arabic and English volumes

Library name	Books				Periodicals				Theses & dissertations				Reference work			
	Title		Volume		Title		Volume		Title		Volume		Title		volume	
	Arabic	English	Arabic	English	Arabic	English	Arabic	English	Arabic	English	Arabic	English	Arabic	English	Arabic	English
Library of the Great Man-Made River Project	500	2000	600	3000	20	150	20	150	0	8	0	8	250	150	350	200
Library of the General People's Congress	2000	450	3500	1000	20	5	20	5	150	10	150	10	300	100	300	100
Library of the General People's Committee for Higher	3000	1000	6000	2000	80	20	80	20	80	20	80	20	400	100	800	200
Library of Company of Libya for Insurance	5900	120	6000	120	54	-	54	-	1	-	1	1	100	50	120	50
Library of Central Bank of Libya	8150	3850	10000	4500	80	50	80	50	20	1	20	1	250	50	250	50
Information Unit of Jowef Oil Technology	3000	8000	5000	10000	20	70	20	70	10	50	10	50	300	90	300	90
The Central Library of the National Oil Corporation	3800	4000	4500	5000	25	115	25	115	180	-	180	-	200	100	300	100
The Scientific Library at the Arabian Gulf Company for Oil	2000	6000	3000	6000	15	20	15	20	60	20	60	20	100	50	100	50
The Legal Library	1500	50	1800	60	4	-	4	-	5	-	5	-	70	30	70	30
Library of Misrata General Hospital	400	250	600	350	2	7	2	7	-	-	-	-	40	30	40	30
Library of the Advanced Centre for Administrative and	1500	70	1700	100	6	2	6	2	-	-	-	-	80	20	80	20
Library of the Advanced Centre for Computers	1900	150	2300	150	5	4	5	4	-	-	-	-	70	20	70	20
Library of Management Institute	1400	100	1600	100	4	-	4	-	1	-	1	-	30	10	30	10
Library of Graduate Institute of Medical Techniques	2000	1500	2400	1800	6	8	6	8	-	-	-	-	80	70	80	70
Library of Libyan Jihad Centre for Historical Studies	15000	600	75000	3000	325	375	325	375	163	30	163	30	200	150	300	150
Economic Sciences Research Centre	2022	1390	4000	2000	224	174	224	174	22	-	22	-	80	30	80	30
Library and Research Centre for the Studies of the Green	4000	500	5000	500	15	0	15	-	3	-	3	-	100	20	100	20

Library name	Official publications				Reports				Research papers& conference proceedings				Patents			
	Title		Volume		Title		Volume		Title		Volume		Title		Volume	
	Arabic	English	Arabic	English	Arabic	English	Arabic	English	Arabic	English	Arabic	English	Arabic	English	Arabic	English
Library of the great Man-Made River Project	400	-	600	-	60	100	60	100	40	180	80	400	-	-	-	-
Library of the General People's Congress	8000	1000	8000	1000	6000	500	8000	500	7000	1500	8000	2000	-	-	-	-
Library of the General People's Committee for Higher	4000	500	4000	500	3000	200	3000	200	3500	500	3500	350	-	-	-	-
Library of Company of Libya for Insurance	400	-	400	-	1500	-	1500	-	15	-	15	-	-	-	-	-
Library of the Central Bank of Libya	900	50	900	50	1500	3000	1500	3000	50	10	50	10	-	-	-	-
Information Unit of Jowef Oil Technology	200	50	200	50	700	500	700	500	300	200	300	200	-	-	-	-
The Central library of National Oil Corporation	1000	-	1000	-	12000	500	12000	500	400	200	400	200	-	-	-	-
The Scientific Library at the Arabian Gulf Company for Oil	80	20	80	20	4000	2000	4000	2000	150	80	150	80	-	-	-	-
The Legal Library	2000	-	2000	-	200	-	200	-	-	-	-	-	-	-	-	-
Library of Misrata General Hospital	-	-	-	-	15	25	15	25	-	-	-	-	-	-	-	-
Library of the Advanced Centre for Administrative and	-	-	-	-	40	30	40	30	-	-	-	-	-	-	-	-
Library of the Advanced Centre for Computers	-	-	-	-	-	-	-	-	20	10	20	10	-	-	-	-
Library of Management institute	-	-	-	-	-	-	-	-	30	-	30	-	-	-	-	-
Library of the Graduate Institute of Medical	20	-	20	-	-	-	-	-	40	30	40	30	-	-	-	-
Library of Libyan Jihad Centre for Historical Studies	80	-	80	-	40	-	40	-	80	10	100	10	-	-	-	-
Economic Sciences Research Centres	-	-	-	-	-	-	-	-	70	-	70	-	-	-	-	-
Library and Research Centre for Studies of the Green Book	300	50	300	50	150	10	150	10	200	20	200	20	-	-	-	-

Library name	Audio & video cassettes		CD- ROMs		DVD		Microfiche		Microfilm		Online database		Digital resources	
	Arabic	English	Arabic	English	Arabic	English	Arabic	English	Arabic	English	Arabic	English	Arabic	English
Library of the Great Man-Made River Project	100	150	20	80	25	50	-	-	-	-	-	-	-	-
Library of the General Peoples' Congress	20	10	10	5	10	10	-	-	-	-	-	-	-	-
Library of the General People's Committee for Higher Education	-	-	90	40	90	-	-	-	-	-	-	-	-	-
Library of Company of Libya for Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Library of the Central Bank of Libya	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Information Unit of Jowef Oil Technology	50	15	40	20	30	15	-	-	-	-	-	-	-	-
The Central Library of National Oil Corporation	80	50	-	3000	-	200	2000	4000	1000	5000	18	-	5	5
The Scientific Library at the Arabian Gulf Company for Oil Exploration	-	80	-	-	-	-	-	-	-	-	3	2	-	-
The Legal library	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Library of Misrata General Hospital	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Library of Advanced Centre for Administrative and Financial Occupations	35	20	50	70	30	10	200	50	20	70	-	-	-	-
Library of Advanced Centre for Computers	70	30	60	90	30	80	-	-	-	-	-	-	-	-
Library of Management Institute	-	-	-	-	10	-	-	-	-	-	-	-	-	-
Library of Graduate Institute of Medical Techniques	150	100	120	180	70	90	40	30	-	-	-	-	-	-
Library of Libyan Jihad Centre for Historical Studies	25000	5000	100	30	40	-	50	50	-	-	-	-	-	-
Economic Sciences Research Centre	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Library and Research Centre for the Studies of the Green Book	110	-	110	-	-	-	-	-	-	-	-	-	-	-

Fig 4.11 Information resources in the selected sample of libraries

Information resources	Number of titles		Total	Percent	Number of volumes		Total
	Arabic	English			Arabic	English	
Books	58072	30030	88102	41%	65500	39480	104980
Periodicals	905	1000	1905	1%	905	1000	1905
Theses & dissertations	720	180	900	0.4%	720	180	900
Reference works	2650	1070	3720	2%	3370	1220	4590
Official publications	17380	1670	19050	9%	17580	1670	19250
Reports	29205	6865	36070	17%	31205	6865	38070
Research papers & conference proceedings	11895	2740	14635	7%	12955	3310	16265
Patents	0	0	0	0	0	0	0
Audio & video cassettes	25615	5455	31070	15%	25615	5455	31070
CD- ROMs	600	3515	4115	2%	600	3515	4115
DVD	335	455	790	0.4%	335	455	790
Microfiche	2290	4130	6420	3%	2290	4130	6420
Microfilm	1020	5070	6090	3%	1020	5070	6090
Online databases	21	2	23	0.01%	21	2	23
Digital resources	5	5	10	0.01%	5	5	10
Total	150713	62187	212900	100%	162121	72357	234478
Percent	71%	29%	100%		69%	31%	100%

4.1.8 Audio-Visual Materials

Regarding non-traditional sources of information such as audio-visual materials, librarians were requested to indicate whether their libraries stocked audio-visual materials and to indicate what sorts of equipment were available and in what numbers.

Table 4.12 depicts the amount of equipment available in the sample of special libraries and information centres. It can be seen that the sample of libraries are not well supplied with audio-visual materials, nor with the equipment necessary for displaying such materials. Only one library among the libraries surveyed owned a slide projector and just two libraries had a microfilm reader. Only 29% of the libraries in the sample had a photocopier, which means that the majority of the libraries were unable to provide photocopying services. The overall picture shows that special libraries and information centres in the sample still relied on traditional sources of information for providing user services, since the equipment needed for displaying such materials was available in very few libraries.

Table 4.12: Library equipment

Library equipment	Number	Library equipment	Number
Microfilm reader	2	Film projector	4
Microfiche reader	4	Slide projector	1
Tape recorder	7	DVD player	9
Cassette player	11	Overhead projector	7
Photocopier	5	CD Player	10

4.1.9 Annual Rate of Increase

Librarians were asked to indicate the annual rate of increase of their library collection. Responses ranged from 3% to 5%, which in most cases is not a good sign, as the number of books stocked was low in many cases, especially in the sector of specialised higher institutions. In order to identify the annual rate of increase librarians were asked to give details of the number of books added over the last three years. Table 4.13, shows how many books were added to library stock over the last three years.

Table 4.13: Annual increasing rate

Library name	2005	2006	2007
Library of the great Man-Made River Project	90	80	130
Library of the General People's Congress	50	100	70
Library of the General People's Committee for Higher Education	90	120	50
Library of Company of Libya for Insurance	70	130	30
Library of Central Bank of Libya	210	70	120
Information Unit of Jowef Oil Technology	230	90	190
The Central Library of National Oil Corporation	180	120	200
The Scientific Library at the Arabian Gulf Company for Oil Exploration	100	80	110
The Legal Library	20	30	0
Library of Misrata General Hospital	0	40	30
Library of the Advanced Centre for Administrative and Financial Occupations	20	0	70
Library of the Advanced Centre for computer	70	30	50
Library of management institute	30	20	40
Library of Graduate Institute of Medical Techniques	70	0	70
Library of Libyan Jihad Centre for Historical Studies	240	190	260
Economic Sciences Research centre	90	0	70
Library and Research Centre for the Studies of the Green Book	170	90	130
Total	1730	1190	1620

The annual growth rate of books was calculated using the following equation:

Annual growth rate = $\frac{\text{The current year – The previous year}}{\text{The previous year}}$ X 100

Total number of books added over the last three years = 4540

2004	2005	2006	2007	
88102	1730	1190	1620	
	89832	91022	92642	
	2.0%	1.3%	1.8%	Annual growth
		3.3%	5.2%	Compound growth

Figure 4.9 demonstrates that the figure given by librarians on annual growth ratio of books was to a certain extent inaccurate. According to the calculation, the exact rate of increase in books ranged between 2.0% and 1.8% over the last three years. The annual rate of increase for books in the sample began in 2005 with 2.0% and then fell to 1.3% in the following year. In 2007, the annual growth rate rose to 1.8%. The compound growth for the three years was 5.2%.

The fluctuation of the annual growth rate indicates that the allocated budget for special libraries in the selected sample was not constant. Consequently, libraries were not able to acquire materials that met user needs as a library's budget is the driving force and with an inadequate budget special libraries were not able to provide a good level of services.

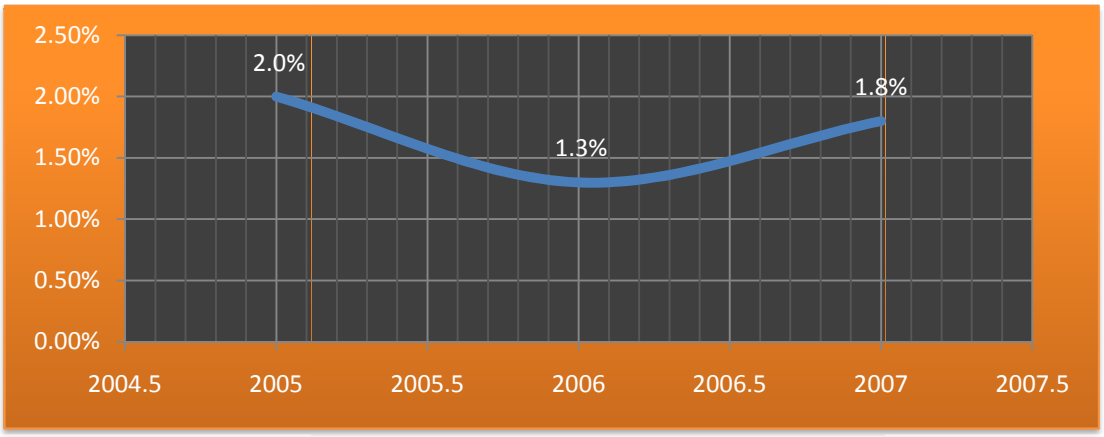


Fig.4.9: Annual growth ratio

4.1.10 Digital Collection

Respondents were asked whether their libraries held digital collections or not and to indicate the main reasons for not acquiring digital materials if they did not possess such materials.

The responses revealed that only two libraries (12%) had digital materials out of the total number of libraries and information centres in the sample, which is a very low percentage. The reasons for not acquiring digital materials in almost all cases, was a shortage of funding. Other reasons for not acquiring such materials lay in the fact that most special libraries and information centres in the sample did not have the qualified staff who could deal with such materials or even understand the significance of the availability of digital resources for the advancement of research work in those organisations.

Respondents were asked to indicate the proportion of digital materials in comparison with conventional resources. Two libraries indicated that digital materials represented 4% of the total materials they acquired. This means that over 85% of the special libraries in the selected sample depend on traditional sources of information to provide library services, whereas there is a tendency among special libraries and information centres around the globe to acquire digital resources, as these have become one of the most important resources in libraries in developed countries.

Librarians were asked if they expected to acquire digital materials in the next five years. Responses to this question varied from one library to another in the sample. However, 12 libraries (71%) were planning to acquire digital materials in the near future while five libraries did not plan to acquire such materials, in the near future at least. Figure. 4.10 reveals libraries intentions of acquiring digital resources in the next five years and the approach that might be implemented to achieve this goal.

Figure 4.10, illustrates that most libraries are going to purchase digital materials from vendors. While some of the selected libraries will use donations as a means for acquiring digital resources, a high proportion of managers are thinking of converting their traditional materials into digital resources.

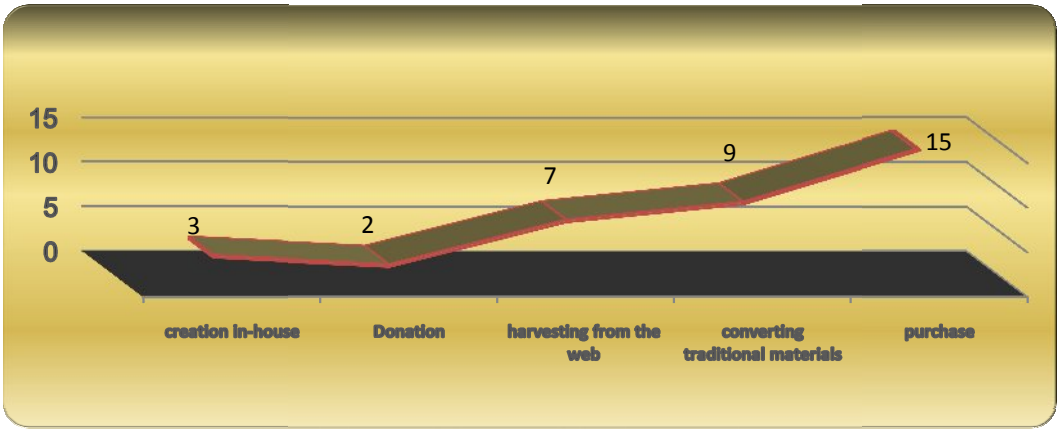


Fig.4.10: How libraries will acquire digital materials

Technical Services

4.1.11 Acquisition

Librarians were asked about the means used for acquiring library materials.

Table 4.14 demonstrates that all libraries relied on straightforward purchasing for acquiring library stock, and it is clear that purchasing dominates the method of acquiring materials in most libraries in the sample. Exchange of library materials with other libraries and donations were also significant in terms of acquiring materials. Reliance on exchanging corporate publications as an approach appeared to be one of the methods used for acquiring library resources from a librarian's point of view but only a few of libraries (12%) relied on this method.

Table 4.14: Type of method used for acquiring library stock

Type of means used for acquiring materials	No. of libraries	Percentage
Purchase	17	100%
Exchange with other libraries	6	35%
Donation	6	35%
Exchange of publications of the parent organisation	2	12%

Librarians were asked to indicate who was responsible for selecting library materials and whether users opinions were taken into consideration in the selection process or not. Table 4.15 demonstrates that librarians played a considerable role in selecting library materials as is shown in the table below where 53% of libraries and information centres in the sample depended on librarians preferences for acquiring library materials.

Twenty-three per cent of libraries relied on the manager of the information unit in the process of selection of library materials. Because of a lack of librarians with a qualification in a relevant subject in most special libraries in Libya the role of this category of staff in the process of selection of library resources seems to be trivial. The table below shows that users do not play any role in the selection of library materials and information resources. This in turn affects users needs and requirements negatively. Neglecting library users suggestions in the supply and selection of library materials results in a lack of representation of their needs and interests.

It is also desirable to pay adequate attention to a diverse means of acquisition and libraries should take advantage of other available ways of acquiring their materials such as exchanging materials with other institutions and organisations in addition to using donations in order to enrich library collections. Table 4.15 illustrates that only a few libraries made use of donations and exchange of materials. It would appear that librarians were unsuccessful in creating relationships with cultural associations and with other publishing houses, as many of them have their own restrictions on donation. Because a substantial proportion of librarians have reservations regarding the issue of accepting books and other libraries materials, libraries have not been able to develop their collections to an effective level, particularly in the absence or lack of other sources of supply.

Table 4.15: Responsibility for selecting library materials

The librarian	9
Library committee	3
Manager of information unit	3
Librarian with qualification in relevant subject	1
Users suggestions	1

4.1.12 Cataloguing and Classification

Classification and cataloguing processes are considered to be one of most essential technical services, which should be carried out by all types of libraries in order for them to be able to organise their content and make them accessible for their patrons. The questionnaire contained a series of questions on this aspect. Librarians were asked to indicate the types of catalogue used in their libraries. Table 4.16 illustrates the types of catalogue used in the sample of special libraries and information centres.

Table 4.16: Types of catalogue used in the selected sample

Library name	Dictionary catalogue	Classified catalogue	Divided catalogue	Electronic
Library of the Great Man-Made River Project	x	x	√	√
Library of the General People's Congress	x	x	√	x
Library of the General People's Committee for Higher Education	x	x	√	x
Library of the Company of Libya for Insurance	x	x	√	x
Library of the Central Bank of Libya	x	x	√	x
Information unit of Jowef Oil Technology	x	x	√	x
The Central Library of the National Oil Corporation	x	√	x	√
The Scientific Library at the Arabian Gulf Company for Oil Exploration	x	x	√	x
The Legal Library	x	x	x	x
Library of Misrata General Hospital	x	x	x	x
Library of the Advanced Centre for Administrative and Financial occupations	x	x	√	x
Library of Advanced Centre for Computers	x	x	√	x
Library of Management Institute	x	x	√	x
Library of Graduate Institute of Medical Techniques	x	x	√	x
Library of Libyan Jihad Centre for Historical Studies	x	√	√	√
Economic Sciences Research Centre	x	x	√	√
Library and Research Centre for the Studies of the Green Book	x	x	x	X

The above table shows that a high proportion of special libraries were still using card catalogues. Seventy-one per cent of the selected libraries relied on subject, title, and author catalogues to provide bibliographic data for their patrons. Only four libraries (26%) had an electronic catalogue. This indicates that there are considerable problems in technical services, as most libraries around the world have converted their traditional catalogues to OPACs in order to be able to expand and provide multiple access to their clients. Technical services are considered to be the key to accessing library materials and holdings. Therefore, greater attention should be paid to such tools otherwise the key to accessing information will remain missing in these libraries until they begin developing their technical services.

Regarding classification and the subject cataloguing process, Table 4.17 illustrates that 82% of libraries in the sample used DDC for classification and 18% had a local scheme specifically designed to classify their collections of books. In fact, this local scheme, as reported by the interviewees, was a very simple system depending on numbers to find library materials. It is an aid that can be used to find out where a specific book or item is located in the library. In fact, it is far away from any known classification system. The reason for not classifying library materials in those libraries was stated by the librarians to be a shortage of qualified staff (subject oriented).

Table 4.17: Classification system used in the selected sample of libraries

Dewey decimal classification (DDC)	14
Library of Congress classification system	0
Local plan	3

Regarding subject classification librarians were asked to indicate what subject headings lists were used for cataloguing library materials. The responses are shown in Table 4.18, which shows that a considerable number of libraries in the sample were still using the Arabic subject headings list and the Library of Congress subject headings list. Only three libraries did not use any kind of subject headings. Accordingly, their collections were not catalogued, despite the importance of this process.

Table 4.18: Subject headings list used in the selected sample of libraries

Library name	Sears subject headings list	Library of Congress	Arabic subject headings
Library of the Great Man-Made River Project	x	√	√
Library of the General People's Congress	x	x	√
Library of the General People's Committee for Higher Education	x	x	√
Library of Company of Libya for Insurance	x	x	√
Library of Central Bank of Libya	x	√	√
Information unit of Jowef Oil Technology	x	x	√
The Central Library of National Oil Corporation	x	√	√
The Scientific Library at the Arabian Gulf Company for Oil Exploration	x	√	√
The Legal Library	x	x	x
Library of Misrata General Hospital	x	x	x
Library of Advanced Centre for Administrative and Financial Occupation	x	x	√
Library of Advanced Centre for Computers	x	x	√
Library of Management Institute	x	x	x
Library of Graduate Institute of Medical Techniques	x	√	√
Library of Libyan Jihad Centre for Historical Studies	x	√	√
Economic Sciences Research Centre	x	x	√
Library and Research Centre for the Studies of the Green Book	x	x	√

4.1.13 Indexing and Abstracting

This operation is considered to be one of the most essential processes to be carried out particularly by special libraries and information centres. These processes are within the scope of subject analysis of the content of information resources which enable libraries to provide various services to end users such as SDI and current awareness, which are considered to be among the most important information services that can be provided by special libraries. Librarians were asked in which ways their libraries provided this type of services. Responses

showed that only a few libraries provided such services. Only three libraries (18%) in the sample provided indexing and abstracting services. These were:

-Library of the Central Bank of Libya

-Library of the Libyan Jihad Centre for Historical Studies

-The Central Library of National Oil Corporation

-The aforementioned libraries provided abstract bulletins which are a publication which is commonly produced by scientific libraries.

The reasons for not being able to provide such services were a shortage of qualified librarians and a lack of the funding necessary for the sustainability of the provision of such services, as reported by the interviewees. Special libraries and information centres should be capable of providing different kinds of indexing and abstracting services such as the provision of abstracts of scientific periodicals and journals; scientific research papers; reports and conference papers; and theses and dissertations. The lack of such services has a negative effect on the performance of research workers as well the performance of employees in general. With regard to indexing services, the libraries mentioned above carry out indexing of some limited information resources such as Arabic periodicals.

4.1.14 Bibliographical Services

Librarians were asked to indicate the level of provision of bibliographical services and were requested to specify whether this type of service was successful in meeting users needs and requirements. Just over half (55%) of the special libraries in the sample reported that bibliographical services were provided. The rest (45%) reported that they faced difficulties in providing such services due to a shortage of qualified librarians. The absence of professional staff has affected technical services considerably. Despite the importance of bibliographical lists as one of the most important resources for monitoring intellectual output and making it available for the benefit of library users, and hence improving the performance of reference desk services, some special libraries are still incapable of providing such services for the benefit of the library's clients. Surprisingly, when the users surveyed were asked to indicate their satisfaction with library services and the performance of special libraries in the provision of bibliographical service, their responses showed that the libraries performances exceed users expectations. This could be interpreted as library users not yet having grasped the meaning of

bibliographic services and might be linked to the lack of materials which market the services provided by the library.

4.1.15 Budgeting

The budget is considered to be a key driving force for libraries, as without it, its objectives will be disrupted and its services will stop. The provision of library services depends on the availability of an adequate budget. In order to ascertain the availability of adequate financial allocations for special libraries in Libya librarians were asked if they had separate budgets, and whether the allocated budget met the library's requirements or not. Table 4.19 shows the availability of budgets in the sample of special libraries and information centres.

Table 4.19: Sufficiency of allocated budget

Library name	Availability of separate budget		Effective financial allocations	
	Yes	No	Yes	No
Library of the Great Man-Made River Project		√		√
Library of the General People's Congress		√		√
Library of the General People's Committee for Higher Education		√		√
Library of Company of Libya for Insurance		√		√
Library of the Central Bank of Libya	√		√	
Information Unit of Jowef Oil Technology	√		√	
The Central Library of National Oil Corporation	√		√	
The Scientific Library at the Arabian Gulf Company for Oil Exploration	√			√
The Legal Library		√		√
Library of Misrata General Hospital		√		√
Library of Advanced Centre for Administrative and Financial Occupations		√		√
Library of Advanced Centre for Computers		√		√
Library of Management Institute		√		√
Library of Graduate Institute of Medical Techniques		√		√
Library of Libyan Jihad Centre for Historical Studies		√		√
Economic Sciences Research Centre		√		√
Library and Research Centre for the Studies of the Green Book			√	

Table 4.19 demonstrates that only four libraries out of the seventeen surveyed libraries had a separate budget. Libraries belonging to oil companies had an adequate budget and in most cases the allocated budget sufficed for the library's needs and requirements. Only two libraries not affiliated to oil companies in the selected sample had the advantage of a separate budget. These were:

1- Library and Research Centre for the Studies of the Green Book.

2- Library of the Central Bank of Libya.

The majority (71%) of libraries and information centres in the sample suffered from a shortage of budget, which had a negative impact on their services, as these libraries were not capable of providing an effective level of services without an adequate budget.

Librarians were also requested to identify how much they had spent the previous year on books, serials, and on-line services. The majority of librarians did not respond to this question. Only two libraries reported that they had spent 30% of the allocated budget on serials and 70% on books.

User Services

4.1.16 Reference Services

Reference services are among the most significant services provided by special libraries or information centres to respond to any query raised by their clientele. In order to identify the availability and the range of reference services in the selected sample, librarians were asked to indicate how the special library provided such services to their users.

Table 4.20 summarises the methods employed for the provision of reference services in the sample.

Table 4.20: Type of reference service

Library name	Telephone	E-mail	Traditional reference desk staffing	Virtual reference
Library of the Great Man-Made River Project			√	
Library of the General People's Congress			√	
Library of the General People's Committee for Higher Education			√	
Library of Company of Libya for Insurance			√	
Library of the Central Bank of Libya			√	
Information Unit of Jowef Oil Technology			√	
The Central Library of National Oil Corporation	√	√	√	
The Scientific Library at the Arabian Gulf Company for Oil Exploration			√	
The Legal Library			√	
Library of Misrata General Hospital			X	
Library of Advanced Centre for Administrative and Financial Occupation			√	
Library of Advanced Centre for Computers			√	
Library of Management Institute			√	
Library of Graduate Institute of Medical Techniques			√	
Library of Libyan Jihad Centre for Historical Studies			√	
Economic Sciences Research Centre	√		√	
Library and Research Centre for the Studies of the Green Book			√	

Table 4.20 illustrates the types of reference services provided by special libraries in the sample. The majority of libraries in the sample provided reference services for their clients. The Library of Misrata Hospital was the only library that did not provide this service. It is also apparent that the traditional reference desk was the typical type of reference service in almost all special libraries in the sample. Only two libraries provided more unconventional reference services. These were the Central Library of the National Oil Corporation, which provided, besides the traditional reference desk, telephone and e-mail reference services, and the Library of the Economic Sciences Research centre, which provided telephone reference services.

Librarians were also asked to identify who was responsible for providing reference services to users. The responses show that a librarian was usually responsible for answering users queries in most cases. Regarding the number of enquiries that librarians usually had to deal with, respondents were requested to indicate how many enquiries were answered this year according to the librarians best estimate. The responses received showed that answered enquiries ranged between 200 and 1200.

4.1.17 Current Awareness Service

A current awareness service is concerned with the dissemination of the latest information in a narrow field. It is designed to keep library users up-to-date with recent references on their subject. There are two style of current awareness service, print and electronic. Nowadays, many databases offer a regular update or alert when users save a subject or topic search. In order to obtain a closer view on current awareness services in the sample of special libraries and information centres, librarians were asked whether the library provided such services to users or not. The responses received showed that out of the 17 libraries surveyed only nine provided a current awareness service to their users. When users were asked whether they benefited from such a service from their special library, the response showed that only 40% of the users surveyed took advantage of such services, which contradicted the librarians' response that claimed a high uptake.

Librarians were requested to specify the ways in which this type of service was provided and to state whether it was provided in a print form or in an electronic form. From the responses it is apparent that only two libraries (12%) provided current awareness electronically and that the rest (88%) provided it in print form. This indicated that electronic services in general were not well developed and not widely applied by special libraries.

To identify what sort of current awareness service was commonly provided by special libraries and information centres in the sample librarians were asked to indicate the nature of existing current awareness. Table 4.21 demonstrates how this service was provided to end users

Table 4.21: Types of current awareness

Library name	Books alert	Articles alert	Symposia & conference papers	Current resources
Library of the Great Man-Made River Project	√	X	X	X
Library of the General People's Congress	X	X	X	X
Library of the General People's Committee for Higher Education	X	X	X	X
Library of the Company of Libya for Insurance	X	X	X	X
Library of Central Bank of Libya	√	√	X	X
Information unit of Jowef Oil Technology	√	√	√	X
The Central Library of the National Oil Corporation	√	√	X	√
The Scientific Library at the Arabian Gulf Company for Oil Exploration	√	√	√	X
The Legal Library	X	X	X	X
Library of Misrata General Hospital	X	X	X	X
Library of Advanced Centre for Administrative and Financial Occupations	X	X	X	X
Library of the Advanced Centre for Computers	X	X	X	X
Library of Management Institute	√	√	X	X
Library of Graduate Institute of Medical Techniques	X	X	X	X
Library of Libyan Jihad Centre for Historical Studies	√	√	X	X
Economic Sciences Research Centre	√	√	X	X
library and Research Centre for the Studies of the Green Book	√	√	√	X

It can be clearly seen that book alert and article alert services were the most common current awareness services provided to special library users. A few libraries (18%) in the selected sample provided symposia and conference papers alerts and only one library provided an internet resources alert. The overall picture of current awareness services in the selected sample would seem to be inadequate. Despite the importance of current awareness service, a considerable number of special libraries were still unable to provide such a service, which would normally effect R&D in a negative way and as a consequence, organisational output.

Librarians were requested to indicate the reasons preventing them from providing such services. Among the most important reasons were a shortage of qualified librarians capable of carrying out technical services and a lack of adequate funding and financial support.

4.1.18 Selective Dissemination of Information Service

To obtain a clearer picture of SDI services in the sample librarians were asked to answer some questions related to the provision of this type of service. Returned responses showed that out of the 17 libraries surveyed only five libraries provided SDI services to their patrons. Respondents were also requested to indicate the methods used for disseminating information to end users. Responses to this question are shown in Table 4.22.

Table 4.22: Forms of SDI service in the selected sample

Library name	Guide synopsis	Fact sheets	Small leaflets	Newsletters
Library of the Great Man-Made River Project				
Library of the General People's Congress				
Library of the General People's Committee for Higher Education				
Library of Company of Libya for Insurance				
Library of Central Bank of Libya	√	X	√	√
Information Unit of Jowef Oil Technology				
The Central Library of the National Oil Corporation	X	X	√	√
The Scientific Library at the Arabian Gulf Company for Oil Exploration	X	√	√	X
The Legal Library				
Library of Misrata General Hospital				
Library of the Advanced Centre for Administrative and financial occupations				
Library of Advanced Centre for Computers				
Library of Management Institute				
Library of Graduate Institute of Medical Techniques				
Library of Libyan Jihad Centre for Historical Studies	X	√	√	X
Economic Sciences Research Centre				
Library and Research Centre for the Studies of the Green Book	X	√	√	X

Table 4.22 above demonstrated that the most commonly used means of disseminating information in the sample were small leaflets and factsheets. Only the Library of the Central Bank of Libya used guide synopsis (a brief summary of of the major points of a written work) for dissemination of information. The overall picture of SDI services in the sample is that they seem to be weak and underdeveloped. The reasons for the absence of such services in almost all the surveyed libraries were the shortage of expert staff and again, lack of adequate financial support, as the librarians reported.

4.1.19 Translation Service

A translation service is considered one of the most significant services, particularly for users who are not familiar with any language other than Arabic. The importance of this service lies in the fact that researchers do not want to miss anything published in any other language in their area of interest. Therefore, special libraries should offer such a service to their patrons. Because of the importance of translation services the questionnaire included some questions on this particular topic. Librarians were asked to indicate whether their libraries provided this service or not and, if so, how the service was provided. Only one library out of the 17 surveyed libraries reported the provision of a translation service at a nominal cost through co-operation with commercial translation bureaus. The rest of the libraries reported the non-availability of this service. In order to discover the reasons preventing the provision of this type of service from the librarians viewpoint respondents were given a list of different reasons for the absence of translation service and were asked to indicate the key reason hindering the provision of this service. Responses to this question revealed that there was agreement among the special libraries and information centres in the selected sample that a lack of resources, both financial and human, was the most important reason followed by the absence of a special section for translation in the library and even in the unit or department to which the library reported. An absence of co-operation programmes with commercial translation bureaus was found not to be the main reason for not providing translation service. There is significant demand for such specialised services, as shown in the analysis of the user questionnaire, which demonstrated that in spite of the high number of user who expressed their need for translation services, very few users had benefited from such a service. Priority and performance evaluation has also shown that the priority assigned by users for this aspect exceeded the libraries ability to deliver the expected level of translation service.

4.1.20 Book Circulation Service

Lending services are one of the most essential services performed by a special library in its quest to achieve its objectives by making its collections accessible to the users. In order to find out the current state of lending services librarians were asked to give details of this service. Table 4.23 illustrates the performance of special libraries in the selected sample. It can be seen that a loan service was available in all of the libraries and information centres but that there were differences in the number of books that users could borrow at a time. Only the Central Library of the National Oil Corporation allowed users to borrow an unlimited number of books at one time. Users of the Jowef Oil Technology Library could borrow more than six books at a time. The rest of the libraries allowed their clients to borrow between one and five books at a time.

Table 4.23: Loan service in the selected sample

Library name	Availability of loan service		Number of books allowed to borrow			
	Yes	No	1-2	3-5	More than 6	No maximum
Library of the Great Man-Made River Project	√			√		
Library of the General People's Congress	√		√			
Library of the General People's Committee for Higher Education	√			√		
Library of Company of Libya for Insurance	√		√			
Library of Central Bank of Libya	√		√			
Information unit of Jowef Oil Technology	√				√	
The Central Library of the National Oil Corporation	√					√
The Scientific Library at the Arabian Gulf Company for Oil Exploration	√		√			
The Legal Library	√		√			
Library of Misrata General Hospital	√		√			
Library of Advanced Centre for Administrative and Financial Occupation	√			√		
Library of Advanced Centre for Computers	√			√		
Library of Management Institute	√					
Library of Graduate Institute of Medical Techniques	√					
Library of Libyan Jihad Centre for Historical Studies	√					
Economic Sciences Research Centre	√			√		
Library and Research Centre for the Studies of the Green Book	√		√			

Librarians were asked to indicate whether or not their libraries participated in any of the following interlibrary loan (document delivery) programmes. The responses received demonstrated that some of the libraries and information centres participated in interlibrary loan programmes. For example, the Central Library of the National Oil Corporation has established an interlibrary loan programme with oil companies in order to supply researchers with documents that were not available within its collection. The Scientific Library of the Arabian Gulf Company for Oil Exploration participated in an interlibrary loan programme with other corporations and institutions in the country. The Library of the Libyan Jihad Centre for Historical Studies also participated in various interlibrary loan programmes such as exchange and sharing of information resources with colleges and universities in the state, as well as interlibrary loan programmes with high schools in the country and with other corporations and institutions. The rest of the special libraries did not participate in any programme.

4.1.21 Electronic Services

Libraries are being gradually converted into electronic libraries and electronic services are being provided in almost all developed countries regardless of their nature and their users. Because of the importance of electronic services special libraries should be able to offer some type of such services to end users in order to satisfy their needs and to meet their requirements. To determine what kind of electronic services were available in the sample of special libraries, librarians were asked whether the following electronic services were available through their libraries.

Table 4.24: Electronic services

Online catalogue ☐	*Other libraries' online catalogue* ☐
Internet access ☐	*Business – management- science- humanities- engineering data*
General articles and news database	*Reference and bibliography databases (e.g. encyclopedia ,*
Electronic full text books, journals or magazines ☐	

Only five libraries out of the 17 surveyed provided some form of electronic services to their clients. These were:

- The Library and Research Centre for the Studies of the Green Book. The library provided general articles and news databases in addition to internet access.
- The Economic Sciences Research Centre. This centre provided internet access, reference and bibliography databases and general articles and news databases.
- The Library of Central Bank of Libya. This library has an electronic catalogue and provided internet access.
- The Library of the Libyan Jihad Centre for Historical Studies. The library had only an electronic catalogue.
- The Central Library of the National Oil Corporation. The library provided general articles and news databases besides an electronic catalogue and online search service. The library had taken out an annual subscription to a special energy database.

4.1.22 Priority and Performance Evaluation

In order to establish priorities and levels of performance librarians were asked to indicate the priority the library would give to each actual or possible library service, using a Likert scale. Following this the librarians were requested to rate the library performance in providing the service. The order of the library services in the second question was different from that in the first question. This was intended to encourage the respondents to read the question carefully and rate each library service appropriately. All services were identified using short alphabetical labels. Table 4.25 summarises the services and the labels assigned to each one.

Table 4.25: Identification lables used for library services

Type of services	Letters used for identification
Translation services	TS
Interlibrary loan services	IL
Current awareness services	CAS
SDI services	SDI
Electronic services	ES
Retrospective search services	RSS
Reference services	RS
Bibliographical services	BS
Book circulation services (lending)	BCS
Timeliness for information services	TIS
Availability and accessibility of staff	AAS
Accuracy of information services	AIS

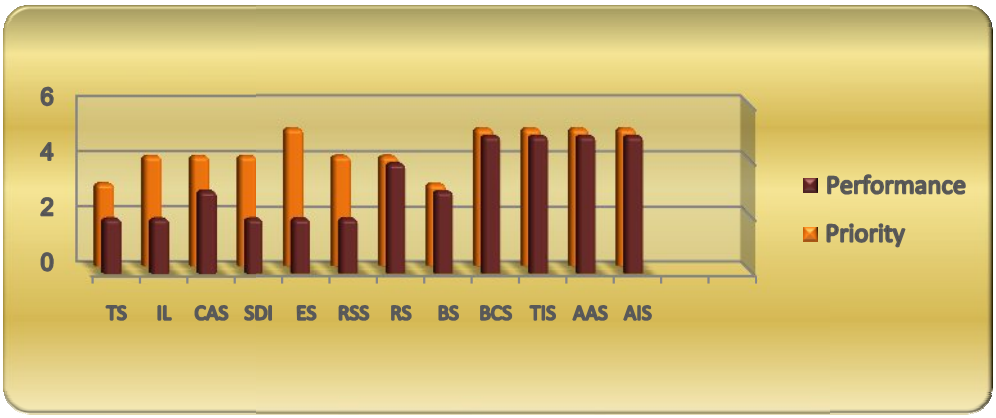


Fig 4.11: Priority and performance results

4.1.23 Priority and Performance Results

Figure 4.13 shows the results of priority and performance evaluation. For the first six services, the priority assigned by the librarians corresponded to the libraries ability to deliver the expected level of service. For the next six services, the priority assigned by the librarians exceeded the libraries performance and ability to deliver the desirable level of service. This means that librarians were aware of the importance of the services they should be capable of providing to end users but the existing services were still not up to the desiredlevel.

4.1.24 Networking and Manipulating Data and Information

In order to find out about the current state of IT infrastructure in the selected sample of special libraries, the questionnaire included some questions on this topic. Nowadays, an adequate IT infrastructure is more essential to any library than ever before as almost all developed services depend on the availability of such technology. To identify the numbers and the areas of computer use, librarians were asked to indicate how many computers the library owned and the areas of computer use in the sample of special libraries and information centres. The responses are shown below in Table 4.26.

1. For Library Activities

Table 4.26: Numbers and areas of computer use

Library name	Word processing	Spreadsheet	Administrative	Training and	Number of computers
Library of the Great Man-Made River Project	√				1
Library of the General People's Congress	√	√			2
Library of the General People's Committee for Higher Education	√	√			3
Library of Company of Libya for Insurance					0
Library of Central Bank of Libya	√	√			5
Information Unit of Jowef Oil Technology	√	√			3
The Central Library of National Oil Corporation	√	√			5
The Scientific Library at the Arabian Gulf Company for Oil Exploration	√	√			3
The Legal Library	√				1
Library of Misrata General Hospital					0
Library of Advanced Centre for Administrative and Financial Occupation	√	√			2
Library of Advanced Centre for Computers	√	√		√	4
Library of Management Institute	√	√			2
Library of Graduate Institute of Medical Techniques	√				2
Library of Libyan Jihad Centre for Historical Studies	√	√			7
Economic Sciences Research Centre	√				2
Library and Research Centre for the Studies of the Green Book	√	√	√		3

Table 4.26 demonstrates that 15 libraries of the 17 surveyed owned computers but that was a difference in the number of computers available in each one. Only the library of the Misrata General Hospital and the Library of the Company of Libya for insurance were not equipped with such devices. Regarding areas of use of computers, it can be seen that the majority of libraries made use of computers for activities such as word processing and spreadsheets. Only two libraries used computers for training and education in addition to administrative purposes.

2. For Managing Collections

The use of computers for managing collections in the selected sample varied from library to library. A small number of libraries (42%) made use of computers for managing the library's collection. For instance, the Library of the Central Bank of Libya used computers for the loan service, data basis management, information storage and retrieval and for providing electronic library services. The other four libraries used computers for various technical services in addition to the loan service, information storage and retrieval and data basis management.

3. For the General Use of Library Patrons

Table 4.27: Use of computers by library patrons

Library name	Internet	Word processing	Training & education	Internal resources	External resources
Library of the GreatMan-Made River Project	√			√	
Library of the General People's Congress	√	√			
Library of the General People's Committee for Higher Education		√			
Library of Company of Libya for Insurance					
Library of Central Bank of Libya					
Information unit of Jowef Oil Technology	√	√		√	
The Central Library of the National Oil Corporation	√	√		√	√
The Scientific Library at the Arabian Gulf Company for Oil Exploration	√	√			
The Legal Library					
Library of Misrata General Hospital					
Library of Advanced Centre for Administrative and Financial Occupations		√	√		
Library of Advanced Centre for Computers	√	√	√	√	√
Library of Management Institute	√	√	√		
Library of Graduate Institute of Medical Techniques		√		√	
Library of Libyan Jihad Centre for Historical Studies	√	√		√	√
Economic Sciences Research Centre				√	√
Library and Research Centre for the Studies of the Green Book				√	

Table 4.27 illustrates that users did not make use of computers in four libraries because they were not available to them. However, in the rest of the libraries users benefited from using computers in different ways. They used computers for searching internal and external resources, in addition to browsing the internet and, in some cases, for training and education purposes.

Connection to the Internet

Librarians were asked to indicate whether the library was connected to the internet and if so, how it was connected. Of the 17 libraries surveyed, only eight libraries were connected to the internet. Some of them were connected through modems and some through local area network (LAN). Respondents were also requested to indicate how many computers were connected to the internet from the total number of computers of the management or the unit to which the library reports.

The total number of computers connected to the internet varied from library to library. For instance, the number of computers in libraries that belonged to oil companies was higher than the number of computers in other sectors. The following table demonstrates the number of computers connected to the internet in the selected sample of special libraries.

Information Unit of Jowef Oil Technology	37
The Central Library of the National Oil Corporation	80
Library of the Arabian Gulf Company for Oil Exploration	42
Library of the Great Man-Made River Project	80
Library of the General People's Congress	35
Library of the Advanced Centre for Computers	25
Library of Management Institute	15
Library of Libyan Jihad Centre for Historical Studies	10

Librarians were asked to state whether computers were connected to other networks or not. The responses showed that only the Central Library of the National Oil Corporation is

connected to an international network through Lesel Lie point to point. The rest of libraries are not connected to any other information network.

None of the libraries surveyed had its own web site. However, some of them had a link on the website of the organisation to which the library belonged, such as the Central Library of the National Oil Corporation and the Library of the Libyan Jihad Centre for Historical Studies. Respondents were also asked to indicate whether the library had a specialised database or not. None of the libraries in the selected sample had such a database. Librarians were requested to give details of the specifications and types of hardware in the department to which they report. Table 4.28 below depicts specifications of the available hardware.

Table 4.28: Types and specifications of available hard wares

Library name	Type	Operating system	Processor speed	Number of	Number of
Library of the Great Man-Made River Project	Samsung	Windows	Pentium3	1	1
Library of the General People's Congress	HP	Windows	Pentium4	2	2
Library of the General People's Committee for Higher Education	HP	Windows	Pentium 3	3	2
Library of Company of Libya for Insurance	0	0	0	0	0
Library of the Central Bank of Libya	Toshiba	Windows	Pentium4	5	2
Information unit of Jowef Oil Technology	Compaq	Windows	Pentium4	3	2
The Central Library of the National Oil Corporation	Compaq	Windows	Pentium4	5	3
The Scientific Library at the Arabian Gulf Company for Oil Exploration	Compaq	Windows	Pentium4	3	2
The Legal Library	Samsung	Windows	Pentium2	1	0
Library of Misrata General Hospital	0	0	0	0	0
Library of Advanced Centre for Administrative and Financial Occupations	Sanyo	Windows	Pentium 3	2	1
Library of Advanced Centres for Computer	Compaq	Windows	Pentium 4	4	2
Library of Management Institute	Toshiba	Windows	Pentium 3	2	1
Library of Graduate Institute of Medical Techniques	Toshiba	Windows	Pentium 3	2	1
Library of Libyan Jihad Centre for Historical Studies	HP	Windows	Pentium 4	7	3
Economic Sciences Research Centre	Compaq	Windows	Pentium 3	2	1
Library and Research Centre for the Studies of the Green Book	Toshiba	Windows	Pentium 3	3	1

Librarians were asked to indicate the availability of the following:

Table 4.29: Availability of necessary infrastructure

Themes	Available	Shortage	Not available
Budget	12%		88 %
IT specialists	6%	94%	
Hardware and other equipment	6%	94%	
Software	6%	94%	
Coordination with other units	18%	82 %	
Availability of information resources	12%		88%

From the librarians responses it can be seen that there were considerable shortages in budgets, IT specialists and hardware and software, in addition to a scarcity of information resources in the selected sample. Special libraries also suffered from a lack of co-ordination with other units in the same organisation, which normally reflects badly on the library and the services that should be provided to end users. A great number of librarians interviewed admitted or reported a dearth of IT specialists. This indicates that special libraries and information centres face serious problems, as this category of worker is essential to assist the department or the unit in providing most kinds of advanced services.

4.1.25 Building Digital Collections

In order to identify what sort of information resources are essential for inclusion in electronic form from the librarians perspective, the questionnaire included a list of information resources and librarians were asked to state which of them were particularly important in a digital library. Figure 4.14 demonstrates the items most frequently used by library users from the librarians point of view and the resources most wanted to be in electronic form.

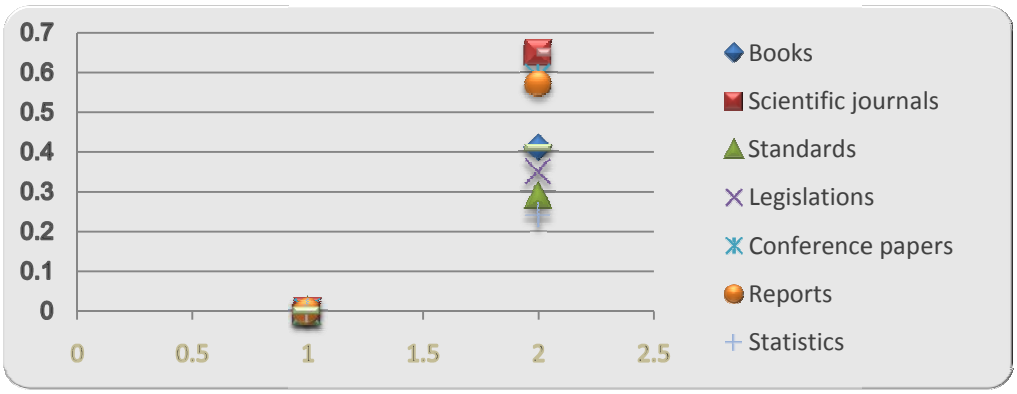


Fig.4.12: Desirable resources to be in electronic form from librarians perspective

Scientific journals and theses and dissertations came first with (65%), followed by conference proceedings (59%) and reports (57%). Other information resources, such as government publications and legislations, would also appear to be of importance. Statistics came last with (24%), followed by standards with (29%). Despite the low priority of these from the librarians viewpoint, they are on the librarians priority list.

Second: Most Important Items

Librarians were also given another list of materials and were asked to suggest which of them were essential in a digital library. This list contained items such as contracts, valuable documents, and significant internal correspondence.

The responses showed that contracts and important documents as well as internal correspondence are of great importance to some libraries, especially those in the energy sector, and the demand for such materials to be available in electronic form was enormous. Responses received from libraries in other sectors varied from library to library. While some librarians believed that internal correspondence was of great importance in a digital library, the majority consider rare documents as essential materials for the digital library.

In order to identify the requirements needed for building a digital library from the librarians' viewpoint, respondents were requested to indicate what sort of things they need in order to build a low cost digital library. The responses are shown in Table 4.30

Table 4.30: Requirements for building digital library from librarians' perspective

Requirements	Percent
Hardware	87%
Software	80%
User training	40%
Staff training	74%
Information resources	53%
Legislations for copyright materials	70%

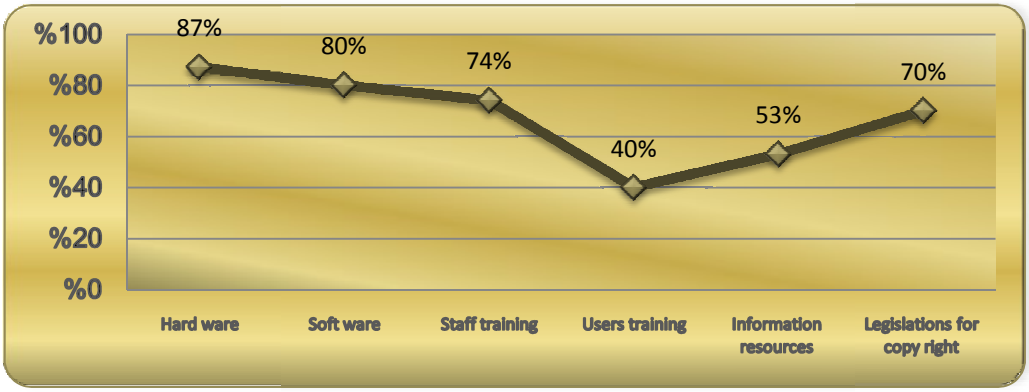


Fig.4.13: Requirements for building digital library

Table 4.30 and Figure 4.15 demonstrate that the most essential requirements for building a digital library were the availability of necessary equipment and hardware (87%). The second most important requirement was the availability of necessary software. Eighty per cent of the responses indicated the significance of this factor. Staff training also played an important role and was considered to be a key factor as a considerable number of librarians (74%) checked this option when asked about the sort of requirements needed for building the digital library. Legislation for copyright also seems to be of great importance, as 70% of respondents reported the significance of such legislation. The availability of information resources was also an important matter from the librarians' perspective as 53% of received responses indicated the importance of such resources for building a digital library. User training came last, with 40% of responses.

4.2 Information Policies and Strategies in the Selected Organisations and Institutions

4.2.1 Developing and Maintaining an Information Infrastructure Within the Organisation

This section is intended to identify whether there is any unit within the sampled organisations or institutions has responsibility for creating an information strategy or policy (a written document or documents regarding information strategies and policies). In fact, the intention was to find out whether organisations and institutions covered by this study have a written document to promote the establishment of information infrastructure within the organisation, such as regulations or rules for recruitment of information specialists or regulations regarding the supply of equipments or the development and improvement of existing equipments, and so forth.

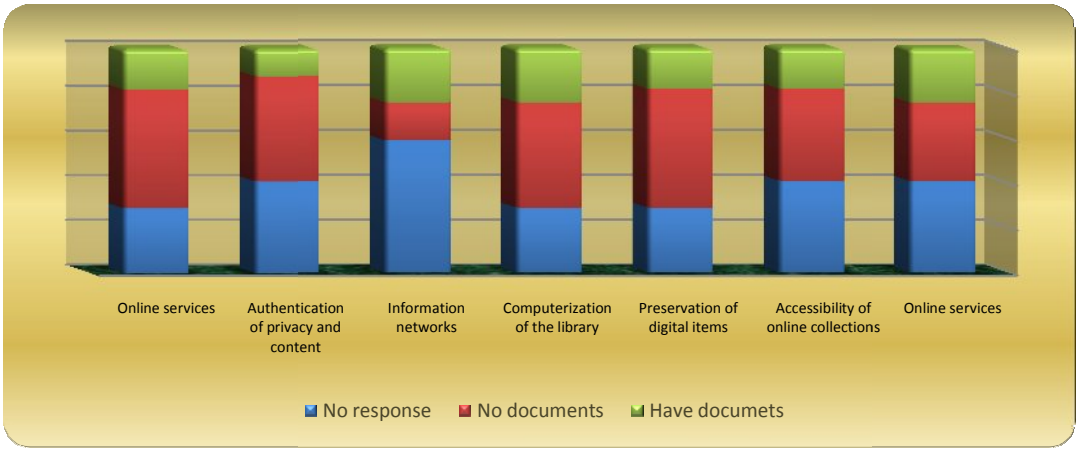


Fig.4.14: Records available on strategies

Figure 4.14 indicates that there is a lack of such documents in the selected sample of special libraries and information centres. Returned responses showed that only a few libraries had a written document for dealing with the information infrastructure. Responses indicated the existence of three instances of documents related to the computerisation of the library and three instances of documents dealing with the preservation of digital materials. No documents were attached with returned responses. Four libraries in the selected sample had a written document related to online services

4.2.2 Responsibility for Intellectual Property and Appropriate Usage of Copyright Materials

Respondents were asked to indicate whether the unit, library or department under their authority had written documents for assisting them in the usage of copyright materials. They were also requested to attach a copy of the document with this questionnaire. Document means in this context a plan, guideline, set of instructions, or framework. This document supposes to address the following aspects intellectual property:

- Publication of employees work in various forms.
- Digital items created by the library or materials that have been converted into digital form.
- Systems or programs designed by employees to be used within the organisation's framework.

The responses demonstrated that only one library in the selected sample had a written document in this regard: the Economic Sciences Research Centre, which had a document to assist librarians in the usage of copyright materials. This document took account of the first two points, which handle the publishing of research work of the organisation's employees in different forms in addition to employees research papers. The rest of the libraries and information centres in the selected sample did not have any such document. As regards the second point, which covers digital items created by the library and materials that have been converted into digital form, only the Central Library of the National Oil Corporation had a written document in this regard. Pertaining to the last point, returned responses showed that no libraries and information centres in the selected sample had a document that covered such issues.

4.2.3 Supporting and Applying Policies of Fair and Appropriate Usage of Copyright Materials.

Respondents were asked to indicate whether the unit, library or department under their authority, had a written document(s) to direct them in the usage of copyright materials. The intention was to discover whether libraries in the selected sample had anything written

covering issues of fair usage of copyright materials by which the usage of digital materials could be regulated. This document was expect to cover various aspects such as:

- Fair use of copyright materials for research and instruction.
- Fair use in the context of electronic learning for developing research activities.
- Licensing for copying and printing of copyright materials.
- Licensing for usage of copyright materials.

Returned responses showed that no libraries and information centres in the selected sample had a document that covered such issues.

4.2.4 Information Technology Infrastructure (includes information network, hardware and software, available online collections)

Managers of information units were asked to indicate whether the library or libraries under their authority have written document(s) for developing information technology infrastructure. Responses showed that very few libraries in the selected sample had such a document(s). Those which did were:

- The Arabian Gulf Company for Oil Exploration
- Economic Sciences Research Centre
- Library and Research Centre for Studies of the Green Book

Managers were also requested to point out whether the library or information centre had a written plan or strategy for developing the information technology infrastructure. If so, they were asked to indicate whether it covered the following points:

- Information networks (establishment and support)
- Reliability (authentication of privacy and content)
- Allocated budget
- Number of computers
- Online services

- Accessibility of online collections
- Internet access
- Access control

Again, only the libraries previously mentioned acknowledged having a written document concerning this subject. Figure 4.17 depicts the points covered by the specified document and the percentage of libraries having documents in this regard.

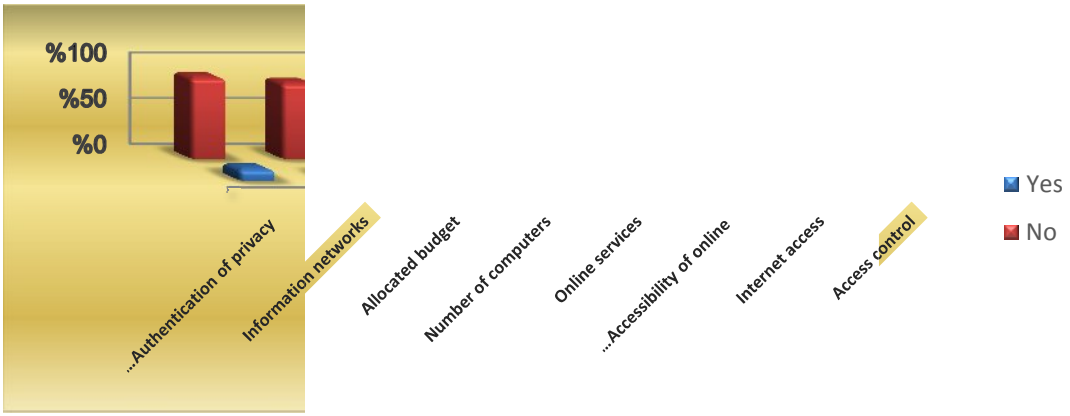


Fig.4.15: Policy with regard to ICT infrastructure

Managers were given three different statements and were requested to check which of them was relevant to the current state and to describe in detail the existing IT infrastructure strategy in their organisation.

- The library has a written plan or strategy as part of the general principle of the organisation.
- The strategy of developing the IT infrastructure exists as a part of the library plan or strategy.
- The strategy for developing the IT infrastructure exists as a plan for the digital library, which includes other units in addition to the library.

Received responses showed that only four libraries (24%) of the selected sample had an IT strategy. Three of them reported that the library had a written plan or strategy as part of the general policy of the organisation. The fourth reported that the strategy of developing the IT infrastructure existed as a part of the library plan or strategy. The rest of the libraries and

information centres in the selected sample had neither a plan nor strategy for developing the IT infrastructure. Managers of information units in the selected sample did not respond to the second part of this question and did not gave details about the existing IT infrastructure strategy in their organisation.

4.2.5 Protection and Conservation of Digital Materials

In order to identify whether the libraries in the selected sample had a plan or strategy for preserving digital materials or not, managers of information units were asked to indicate which of the following statements was most accurate in describing the document(s) pertaining to the unit, library or department under their authority with regard to digital items. They were requested to check one of the following statements:

- The document(s) pertaining to digital items is a part of the general principles of the organisation.
- The document(s) is specifically designed to preserve and maintain the library's digital collection.

Two libraries reported having a document(s) specifically designed to preserve digital collections. Another two libraries reported that preservation and maintenance of digital items is a part of the general principles of the organisation. However, none of these libraries attached a copy of the document. Some of the selected libraries did not respond to this question and the rest confirmed the absence of such a document.

To obtain more information about this matter, librarians were asked to indicate whether the document covered the following points.

- Library catalogue
- Digital items created in the library
- Digital items harvested from the web
- E- journals
- E-books

Only three libraries confirmed that the document covered preservation of the library's catalogue and one library claimed that the document covered digital materials created in the library in addition to preservation of the library's catalogue. The rest of the libraries and information centres reported the absence of such a document.

4.2.6 Training of Human Resources

In order to identify policies pertaining to training programmes run by special libraries, respondents were asked to indicate if the library or libraries under their authority had a written document(s) regarding the training of human resources and whether the document covered the following points:.

- Library staff training
- User training
- Type of training courses
- Cost of training courses

Received responses showed that just under half (47%) of the selected libraries had a document regarding the training of human resources. The document covered different points, as illustrated in Figure 4.18

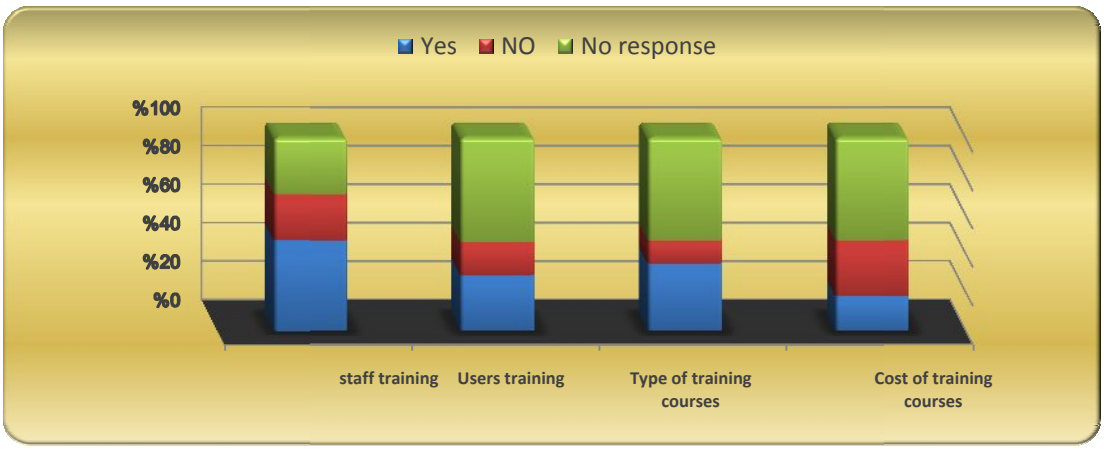


Fig.4.16: Training of human resources

A lack of policies regarding the training of human resources can be seen. Very few libraries and information centres had set up a policy for the training of human resources. A considerable

number of managers did not respond. This might be because of the absence of such a document.

Respondents were also asked the following question: as a manger of the unit, do you have any plan or vision for moving towards electronic digital library services?

Received responses revealed that only four librarians had a plan for providing digital library services. These libraries were:

- The Scientific Library of the Arabian Gulf Company for Oil Exploration
- The Central Library of the National Oil Corporation
- The Library of the Libyan Jihad Centre for Historical Studies
- The Library of the Great Man-Made River Project

The Scientific Library of the Arabian Gulf Company for Oil Exploration indicated that it had set up a new project for the establishment of a technical database. The Central Library of the National Oil Corporation indicated that it there would be a link on the parent organisation's website to provide access to electronic services such as current awareness and SDI services, in addition to online services. The Library of the Great Man-Made River Project indicated that it intended to design a digital library.

4.3 Analysis of User Questionnaire

4.3.1 Numbers and Categories of Users Surveyed

Five hundred and fifty questionnaires were distributed to a sample of special library users in Libya in order to reveal the actual status of the services presented by special libraries in Libya and to discover the extent of users readiness in the use of information technology applications. IT applications are generally considered fundamental tools as they enable users to make the most of the services provided through the special library. Since library services depend nowadays on IT applications, which require users to be highly skilled in their use because the changes made by the advent of the World Wide Web have imposed new obligations on individuals. Accordingly, they have to be computer literate. Figure 4.17 demonstrates the breakdown of users by gender in the responses received. It can be seen that there were twice the number of males (67%) than females (33%).

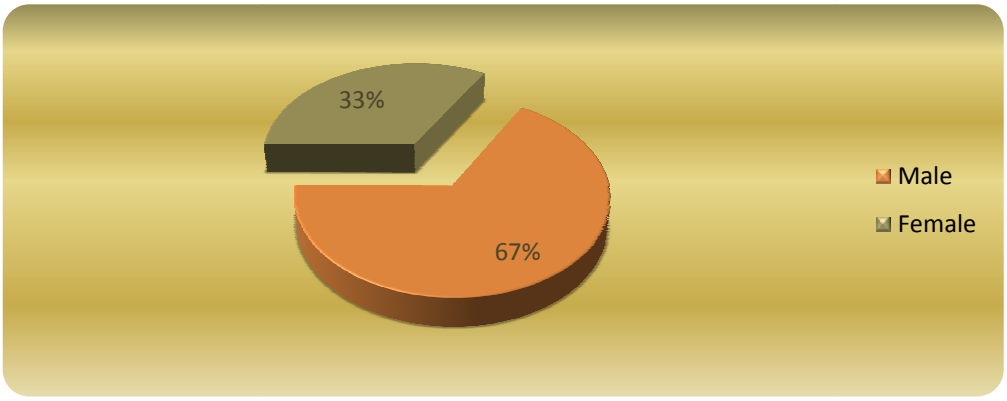


Fig.4.17: Percent and gender of users

4.3.2 User Categories

Table 4.31 and Figure 4.18 illustrate categories of special library users in the sample of special libraries and information centres. It can be seen that the category of employees was larger than that of any other category in the selected sample representing over half (57%) of special library users. Graduates represent the second largest category in the selected sample, with 28%. The reason for this is the inclusion in the sample of four specialised institutes in addition to a number of libraries that provide specialised services to the general public such as the Library and Research Centre for Studies of the Green Book and the Library of the Libyan Jihad Centre for Historical Studies. Postgraduates account for 7% while academics, the smallest group, make up the remaining 2%. Academics in this context refer to university staff members who volunteered

to participate in this study and comprise a category of special library users. There are also a number of users who use the special library and take advantage of its services without being part of the organisation, as a number of special libraries in the selected sample provide their services to the public. This category accounts for just 3% of the total number of library clients in the sample.

Table 4.31: Categories of users

Category	Number	Percent
Employees	237	57%
Research workers	13	3%
Graduates	115	28%
Postgraduates	27	7%
Academics	9	2%
Other	14	3%
Total	415	100%

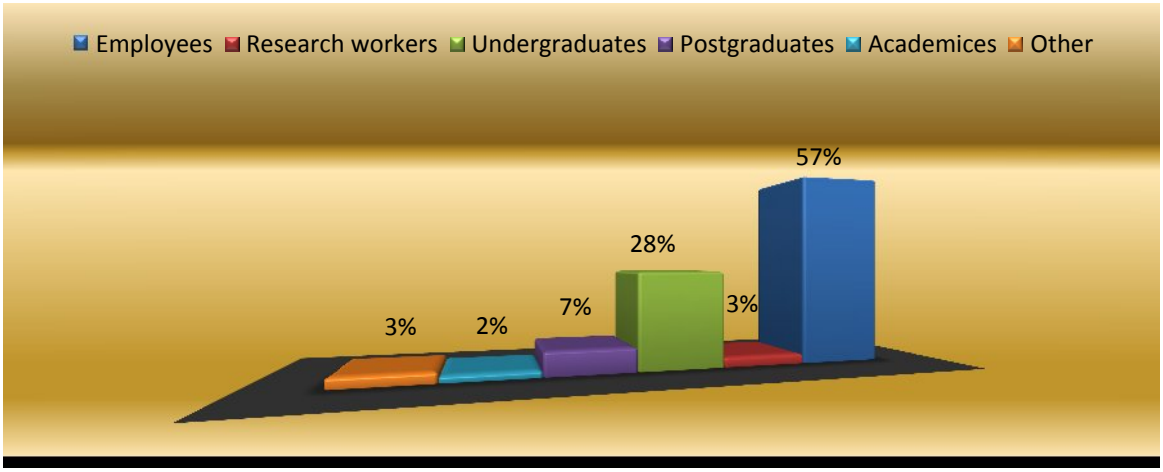


Fig. 4.18: Categories of users surveyed

4.3.3 Age

Table 4.32 and Figure 4.19 demonstrate the age of users surveyed in the sample of special libraries and information centres. From the table, it can be seen that the number of users aged between 26 and 45 make up half (50%) of the total users. The second largest group in the sample are users who are aged between 46 and 60 years old. This group makes up a quarter (25%) of the total users surveyed. Less than one-tenth (9%) of users are aged over 60 years

making this the smallest group in the sample. The youngest group of users surveyed, those who are under 25 years old, represent (16%) of the total users surveyed.

Table 4.32: Age of users in the selected sample

Age	Male	Female	Total	Percent
Under 25	45	22	67	16%
26 - 45	132	74	206	50%
46 – 60	74	30	104	25%
Over 60	32	6	38	9%
Total	277	138	415	100%

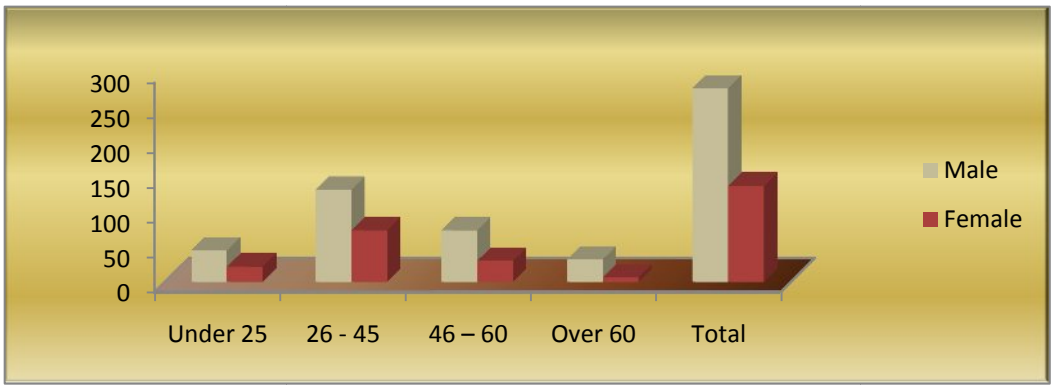


Fig. 4.19: Age of users surveyed

4.3.4 Qualifications

Table 4.33 illustrates that users who held a PhD degree or a Master's degree in the sample accounted for 1% and 14% respectively. More than a quarter (29%) of users surveyed had a Bachelor's degree and just over a fifth (21%) of them had a licentiate degree. Twenty per cent of users surveyed had a diploma. The table also shows a number of users who had only secondary school education.

Table 4.33: User qualification

Degree	Male	Female	Total	percent
PhD	5	1	6	1%
Master's	39	17	56	14%
Licentiate	46	42	88	21%
Bachelor's	88	32	120	29%
Diploma	55	27	82	20%
Secondary School	44	19	63	15%
Total	277	138	415	100%

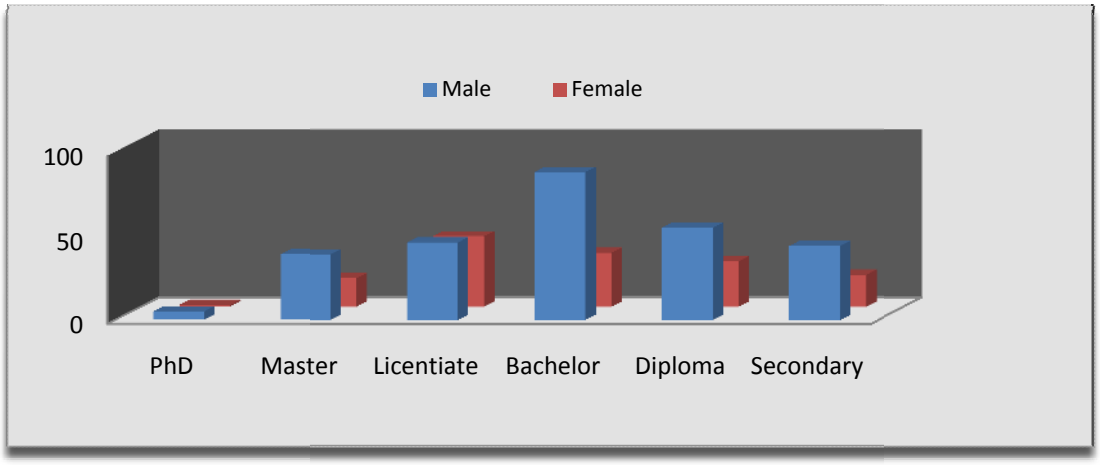


Fig.4.20: User qualifications

4.3.5 Language Proficiency

In order to highlight users ability in dealing with languages other than Arabic, library clients were asked to indicate if they were well-acquainted with languages other than Arabic. Gathering this data was found to be important for the next stage of this research. Figure 4.21 illustrates that English is the second language most used by the users. The males who speak English in the selected sample account for almost two-thirds (65%), while females who speak English as a second language make up slightly more than a third (35%) of the users surveyed. It is important to point out in this context that users who speak English as a second language account for 81% of the total. This means that nearly a fifth (19%) of users surveyed are not well-acquainted with any language other than Arabic. However, it is noticeable that a very high proportion of users are English speakers.

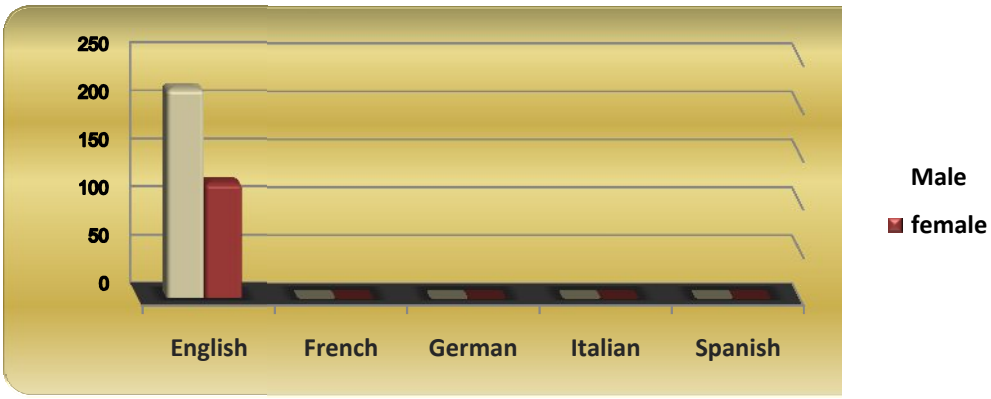


Fig.4.21: Language proficiency

4.3.6 Level of Language Proficiency

To ascertain the level of language proficiency in the selected sample of special library users, library clients were asked to identify their actual level in the use of English on a five-point scale. Table 4.34 and Fig.4.22 demonstrate the actual level of users proficiency in the use of English. It can be seen that good English speakers account for 19%. Twenty-nine per cent of users surveyed considered their level of proficiency to be average and a quarter (25%) of users surveyed reported their level of proficiency as good. Only 8% of the users surveyed considered their level of English language as above average. The table also shows that there was a proportion of users (19%) who were not acquainted with the English language or with any other language other than Arabic. The overall picture is a positive one, as the percentage of users surveyed who are familiar with English was good, which means that special library users can make use of information resources in English. Thus, the opportunity to take advantage of information resources published in English is quite high.

Table 4.34: Level of language proficiency

Level of proficiency	Male	Female	Total	percent
Very good	59	21	80	19%
Good	56	48	104	25%
Above average	19	13	32	8%
Average	83	37	120	29%
Extermely poor	60	19	79	19%
Total	277	138	415	100%

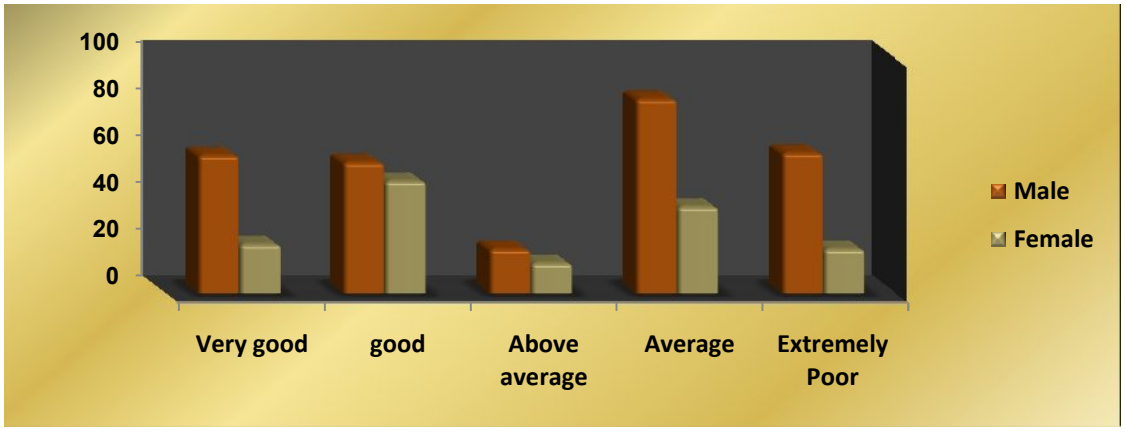


Fig. 4.22: Level of language proficiency

4.3.7 Use of the Library

Users were asked how often they used the library. Responses, as demonstrated in Fig 4.23, showed that slightly more than a third (35%) of the users surveyed visited the library once a

month. Six per cent of the users surveyed reported hardly ever using the library. These figures reflect a low level of library use. Eighteen per cent of library clients reported daily use of the library, while (20%) of users surveyed reported use the library once a month and (21%) made use of the library twice a week. It can be seen that the level of library use in the selected sample was low as daily users accounted for just (18%) of the total number. Fig 4.23 illustrates the rate of library use in the selected sample.

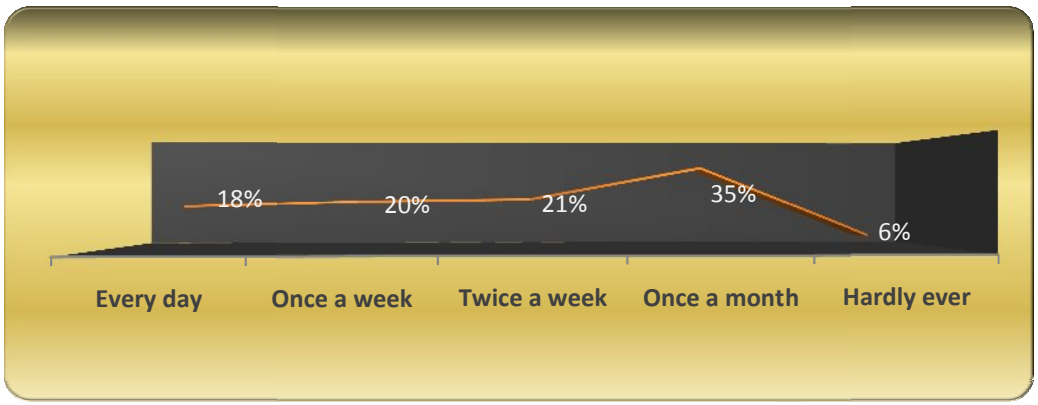


Fig. 4.23: Use of the library

4.3.8 Actual Need for Information Resources

This question was intended to show the extent to which information resources in the selected libraries had been successful in satisfying the needs and requirements of users. It appeared from the responses that available information resources met some user requirements but did not satisfy all their needs. Figure 4.24 demonstrates the actual needs for available resources. Users who expressed their need for existing sources of information accounted for 42%, which is less than half of the users surveyed. Very few (4%) of the users surveyed expressed less demand for existing resources, while just over a quarter (27%) expressed their demand for materials as average and slightly more than a tenth (13%) of the users surveyed considered their need for existing materials as above average. These results demonstrate a considerable lack of interest in the existing resources in the selected sample of libraries, as over 80% thought that resources were at least average. The reasons for such low usage of library materials in the selected sample of libraries may be various, such as lack of materials of interest or inadequate subject coverage as will be shown in the next paragraph.

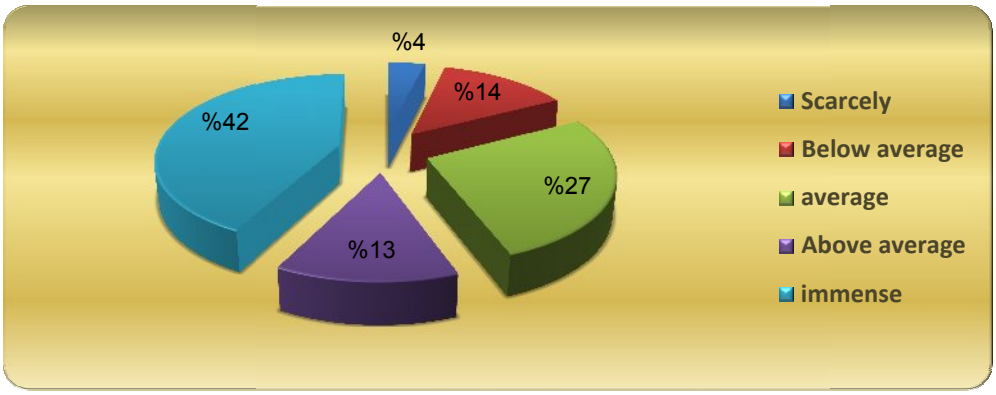


Fig.4.24: Actual needs of information resources

4.3.9 User Satisfaction With Library Collections

Respondents were asked to indicate their satisfaction with library holdings on a five-point scale, where 1 refers to a very unsatisfactory level and 5 refers to a very satisfactory level. Responses, as shown in Figure 4.25, demonstrated that users who considered library holdings as very disappointing accounted for 17% and users who considered the collections as more than adequate made up 15%. A large number of users fell in between as can be seen from the percentage of users who considered library holdings as average. This group accounted for slightly more than a third (37%). It is important to point out in this context that a good proportion of users (23%) indicated a high degree of dissatisfaction. Accordingly, it can be concluded that although there was a proportion of satisfied users, most special library users were not content with special libraries holdings, since almost half of them (40%) expressed a high level of dissatisfaction and the rest (37%) were in between the two.

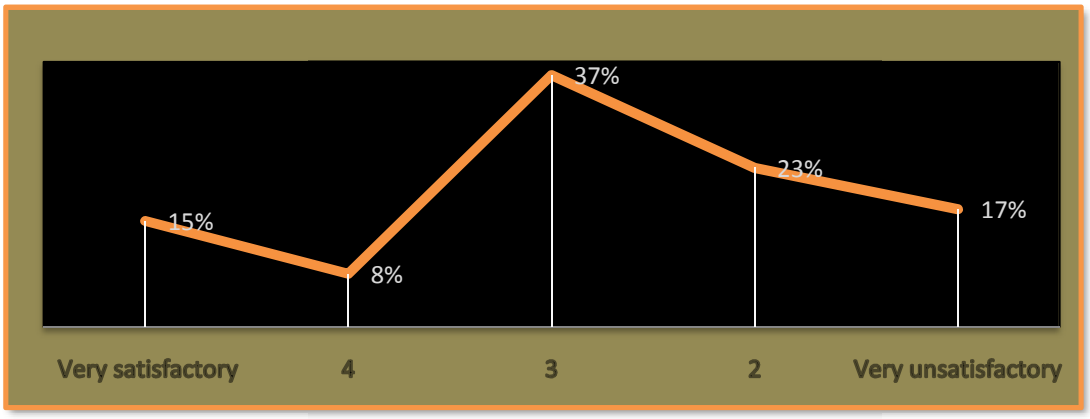


Fig.4.25: Level of users' satisfaction with library' collections

4.3.10 User Opinions on the Coverage of the Library Collection

In order to discover user opinions on the coverage of library collections, users were asked to indicate their satisfaction with the library's subject coverage, again on a five-point scale. Figure

4.26 demonstrates that just under a fifth (19%) of users surveyed expressed their dissatisfaction with the coverage of library materials. In addition, another 19% of the users surveyed expressed a high degree of dissatisfaction. Only a few users surveyed (8%) considered the library's subject coverage as appropriate. The figure also shows that a significant percent (41%) of users considered the coverage of library materials as middling.

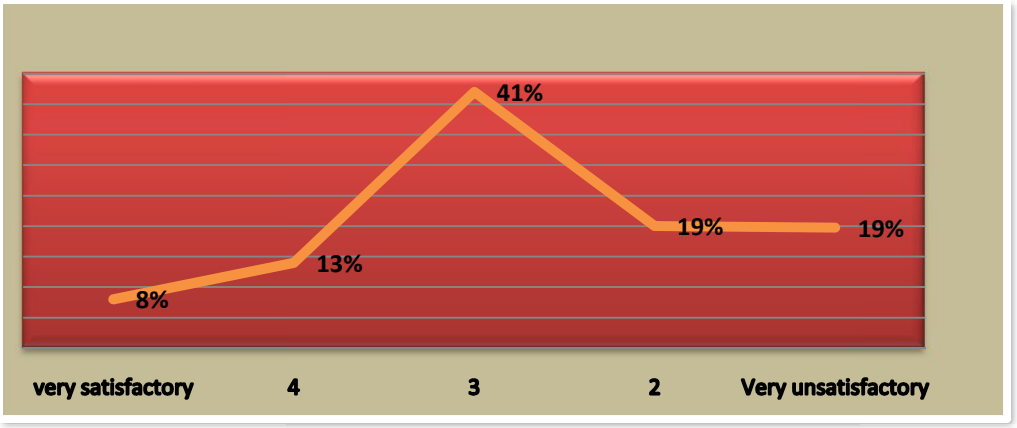


Fig.4.26: Satisfaction of library users with the coverage of the collection

4.3.11 Reasons for Users Criticism and Dissatisfaction With Library Holdings

In order to obtain a clearer picture of users dissatisfaction with library collections and to discover the reasons behind the low level of usage of materials in the selected sample, respondents were asked to indicate the core reasons for their dissatisfaction. Users were given a number of prepared reasons in addition to a blank space offered in the questionnaire to enable respondents to note any other reasons they could specify. Table 4.35 illustrates different reasons for users dissatisfaction. Lack of up-to-date resources appeared to be most important reason for users dissatisfaction. Inadequate subject coverage and lack of materials of interest came next with 23% and 24% respectively. The way of organising library collections was the least important reason for the users dissatisfaction (10%).

Table 4.35: Reasons for users dissatisfaction and criticism

Reasons	No. of responses	Percent
A- Inadequate subject coverage	136	23%
B- Lack of up-to-date resources	256	43%
C- Lack of materials of interest	144	24%
D- Library collections is not well organised	56	10%
Total	592	100%

4.3.12 Ways of Utilising Library Resources

The aim of this question was to discover or reveal the scientific purposes and the non-scientific purpose behind the use of available resources in the selected sample of libraries in order to determine the level of users requirements discussed in the preceding paragraph. Responses, as shown in Table 4.36, revealed that a third (33%) of users surveyed made use of available library materials for the purpose of doing scientific research by employing information gathered for this purpose. The rest of the users purposes varied from preparing work requirements (17%) to personal interest (17%) and for updating information on particular specialised topics (14%). This reflects there being a variety of purposes and reasons for using available sources of information. However, the data illustrated in Table 4.36 gives the impression that the most important purpose of utilising library materials lies with users needs for library resources for doing research.

Table 4.36: Ways of utilising library resources

Ways of utilising library resources	No. of responses	Percent
Doing scientific research	152	33%
Personal interest	80	17%
Work assignments	88	19%
Job requirements	80	17%
Updating information on a particular specialised field	64	14%
Total	464	100%

4.3.13 Most Important and Frequently Used Information Resources

To identify the most important and frequently used resources, respondents were asked to classify a list of information resources according to their needs and requirements. Respondents were also asked to categorise the list on a four-point scale (Essential – Desirable – Nice to have – Negligible). The intention of asking users to categorise information resources in this way was important, as it was assumed that this would give a good indication of users requirements from their own point of view. This in turn would play an important role in deciding the type of resources and materials that would be of interest to users when designing a low-cost digital library in the next stage of this research. Information resources were catagoriesed to three

categories. The first category comprises most essential resources. The second one contains most desirable resources from user perspective and the last category consists of least essential resources from a user point of view.

Figure 4.27 illustrates that books occupied first place, followed by scientific journals and official publications. The second most essential source of information was legislation, followed by conference proceedings and scientific reports. Statistics and theses and dissertations came at the end.

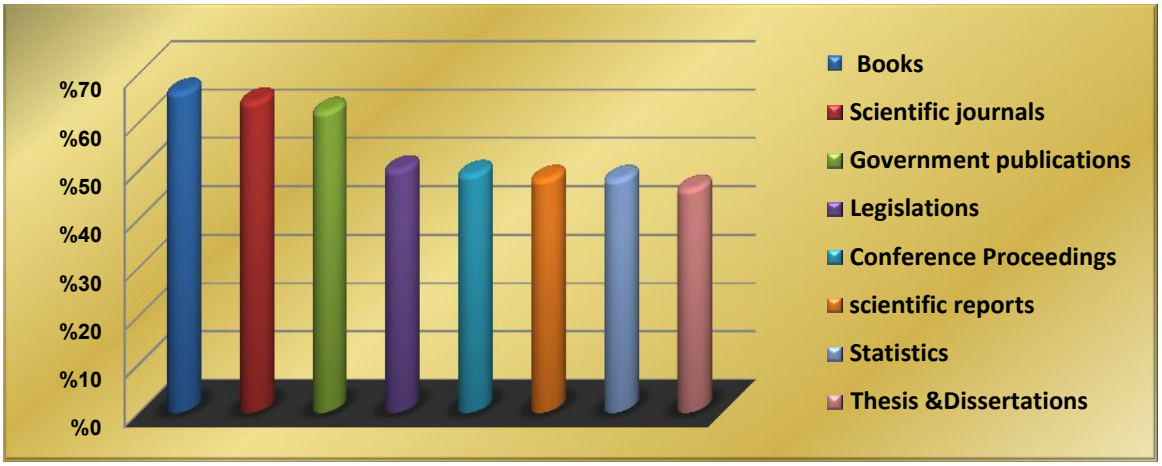


Fig.4.27: Most essential sources of information from user perspective

Audio-visual materials, as demonstrated in Figure 4.28, occupied the first place in the second category, which refers to most desirable information resources, followed by reference work and financial data, in addition to standards and abstract bulletins.

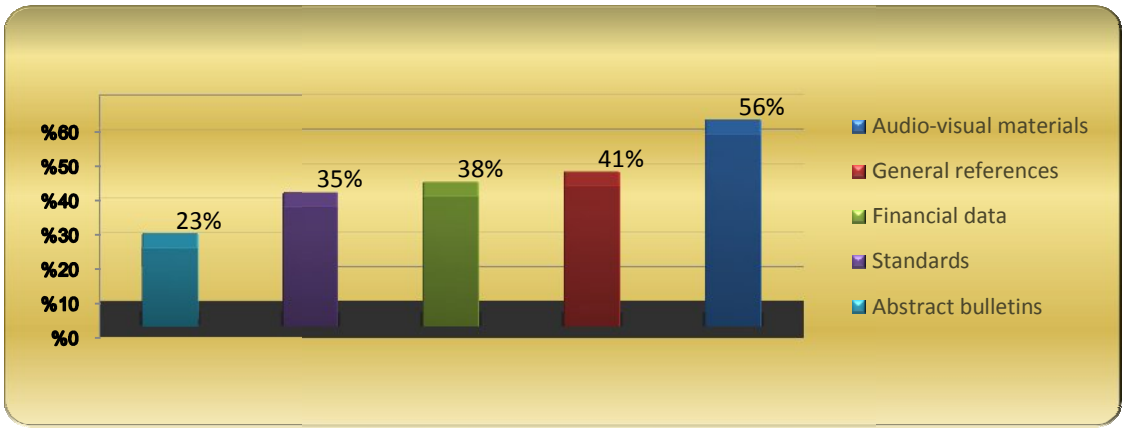


Fig.4.28: Most desirable resources

Stock prices and patents were the least important sources of information, as demonstrated in Figure 4.29, followed by financial data and specifications in addition to literature reviews.

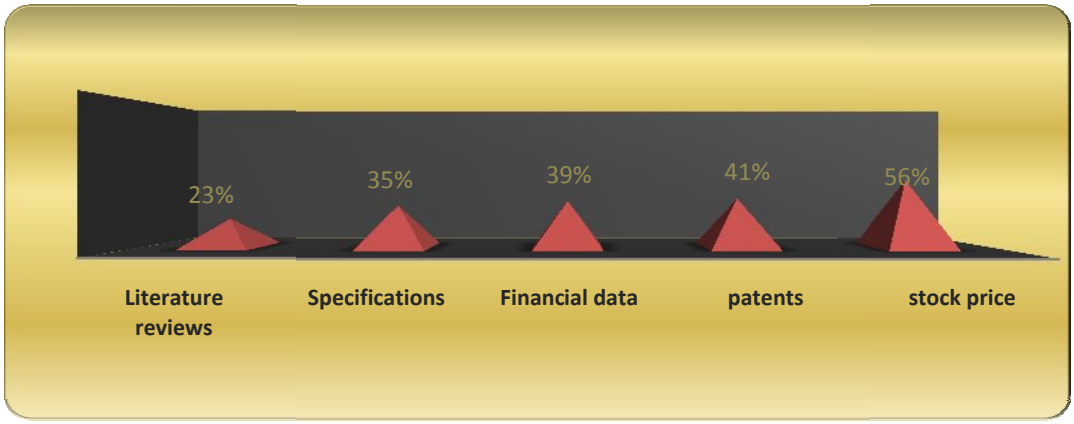


Fig.4.29: least essential resources from users' perspective

4.3.14 Types of Commonly Used Resources

To identify the most frequently used materials, respondents were asked to indicate which type of information materials were frequently used. In fact, such a question is useful in assessing personal tendency of special library clients.

Responses, as shown in Figure 4.30, showed that traditional resources were the most frequently used materials among all special library users. The graph demonstrates that research workers and academics make use of electronic resources more than those in other categories in the sample. Therefore, their usage of electronic information resources was higher than that of all other categories. Graduates used traditional resources more than those in any other category. The percentage of use of audio-visual materials in the sample seemed low compared to the use of traditional resources. It also appeared that there was a consensus among all groups of users that traditional resources are the primary source of information in terms of use with a susceptibility to use other forms by all groups without exception. This was evident in the small proportion of library users who used non-conventional materials, although this proportion was not very large as demonstrated in figure 4.30.

The overall picture gives the impression that the use of traditional resources was still at the top of user preferences. However, this might be because of a shortage of electronic resources or lack of audio-visual materials in the sample of special libraries and information centres.

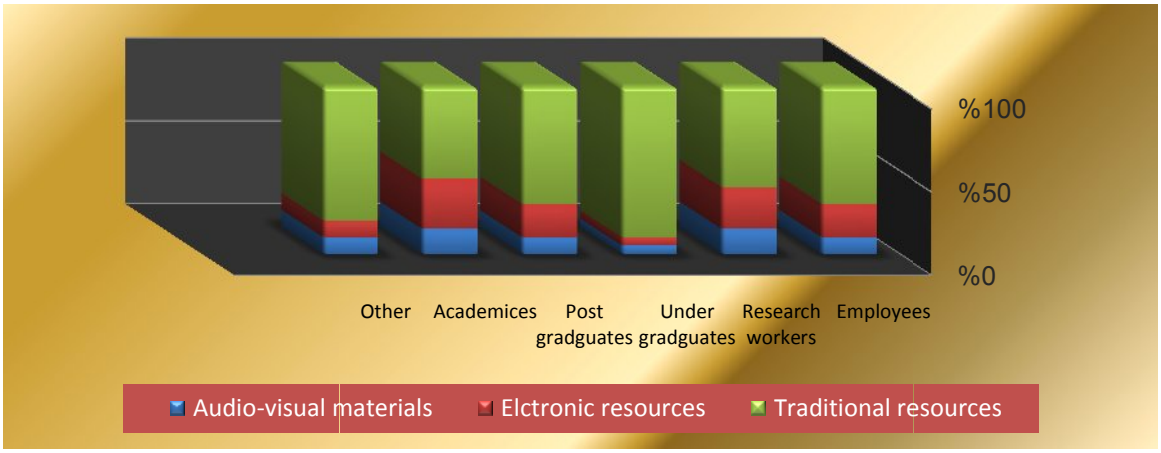


Fig.4.30: Use of traditional resources versus electronic and audio-visual resources

4.3.15 Library Materials Most Desired in Electronic Form

In order to identify the resources most desired in electronic form respondents were asked to choose a number of information resources from a list containing diverse materials and were requested to indicate the types of resources that they considered to be of importance for access on a digital library. Figure 4.31, demonstrates various information resources considered to be of importance in electronic form in a digital library.

It is evident that electronic journals ranked first, with 95% and immediately after these came electronic books with 90%. Official publications and reports also ranked top, with 95% and 90% respectively. Statistics was also ranked highly, with 90%. Newspapers and patents ranked last at just 40% and 50%, followed by literature reviews 60% and specifications 65%. The figure also illustrates other information materials arranged in order of users preferences. As stated previously, there are various information resources, but from the users perspective, it is essential that only some of them are available in electronic form.

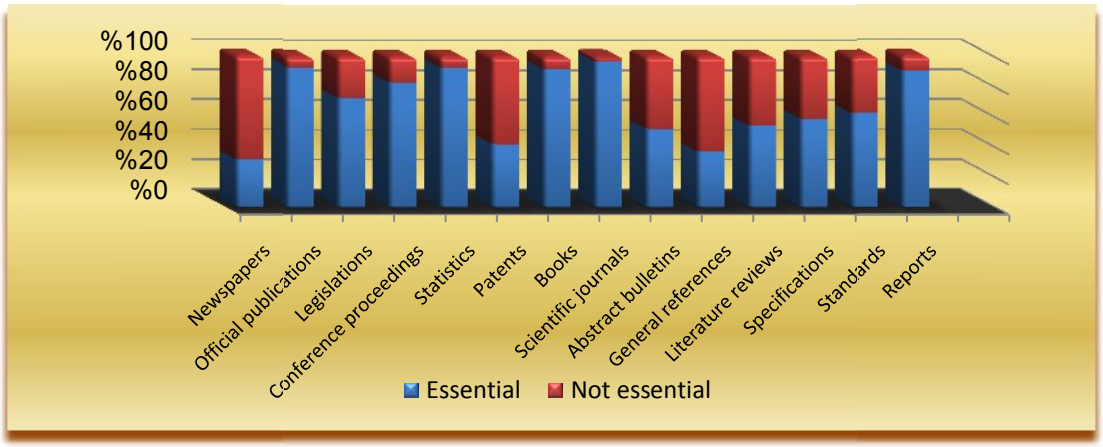


Fig.4.31: Resources most wanted in electronic form

4.3.16 User Opinions on the Services Provided by Selected Libraries

It was important to discover what kind of library services were most significant to library users, and what sort of services were most essential for the benefit of the organisation which provides the financial support. Libraries in general have limited funding; accordingly they are not in a position to provide all types of services. It is well-known that libraries have limited capacity in terms of supplying their users with information resources and services that satisfy their diverse needs and requirements, as mentioned previously. Given the significance of gathering such information, the questionnaire included a question regarding this matter. Library patrons were given a number of various library services and were asked to specify and categorise a number of services according to their importance for research and work requirements, in addition to their impact on their intellectual lives. This can reveal what services have the most positive impact on library clients from different perspectives, personal and professional.

Translation services were ranked by just over one-third (69%) of respondents as the most significant services from a user perspective, as demonstrated in Table 4.37 and Figure 4.33 Interlibrary loans ranked second with 63% followed by current awareness services with 62%. The least essential services from a user perspective are those at the bottom of the table. Book circulation services ranked last with 26%, then bibliographic services with 37% and reference services with 39%. SDI services ranked in the middle, with 57%, followed by on-line search 44% and retrospective search services 43%.

It is generally acknowledged that the aforementioned services play a considerable role in contemporary services; nevertheless few library clients realised the significance of such services. In fact, users may not be at fault in not understanding the importance of such services or for not being aware of such services at all. Users are not to blame if they do not know how such services can benefit them, owing to the fact that it is the librarian's responsibility to make users aware of the benefits of using their services by identifying user needs and requirements and exploring ways to satisfy those needs by providing suitable services. To put it another way, librarians have a professional obligation to make library clients aware of the type of services that could be of potential advantage to them.

Table 4.37: Most important services from a user perspectives

Type of services	Percent
Translation services	69%
Interlibrary loan services	63%
Current awareness services	62%
SDI services	57%
On-line search services	44%
Retrospective search services	43%
Reference services	39%
Bibliographic services	37%
Book circulation services	26%

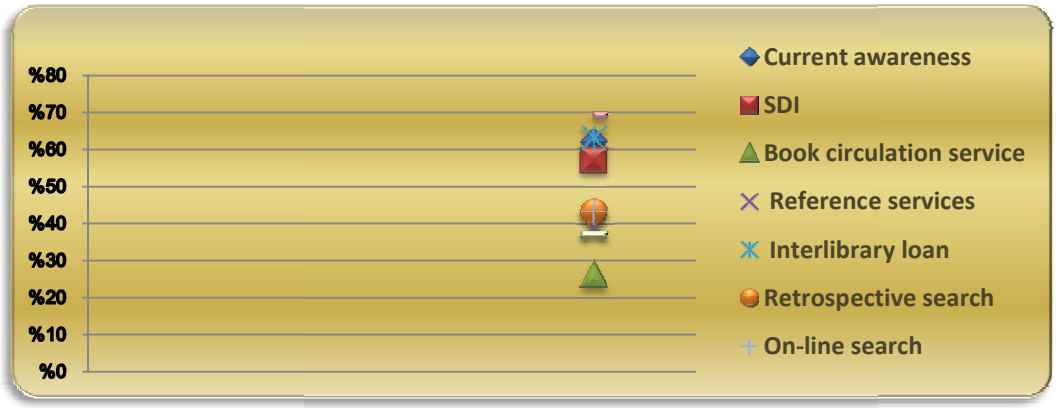


Fig. 4.32: Most important services from users' perspective

4.3.17 Type of Services Available to End-users

To identify what types of library services are provided to special library users, respondents were asked to indicate the type of services available at their libraries. A list of library services was presented for this purpose and a blank space was offered in case the service was not on the list. Figure 4.34, depicts services provided to special library users and the percentage of received responses from the questionnaire regarding this matter. It is noticeable that almost all services are provided by libraries in the sample, but they differ by output. The high percentage of users who make use of traditional library services is one of the most striking features in this graph. It can be clearly seen that almost all libraries provide traditional services. The majority of users surveyed (90%) indicated the importance of the availability of book circulation service and 80% stated that they benefitted from reference services. It was also clear that non-

traditional services were spreading amongst special libraries but were still not widespread, as confirmed by the users surveyed. The graph illustrates a sharp decrease for non-traditional services and it is obvious that more attention should be paid to such new services in order improve them.

The users surveyed who stated that they benefitted from retrospective research services accounted for just 10%. This percentage increased to 20% for translation services, which was previously affirmed as the service most required, from the user view. Electronic services were only available in some libraries; accordingly less than half of the users surveyed 40% took advantage of the availability of such services. A few library users (20%) benefitted from selective dissemination of information services and 40% of users surveyed benefitted from current awareness services. The overall picture gives the impression that non-traditional services still merit further attention for improvements.

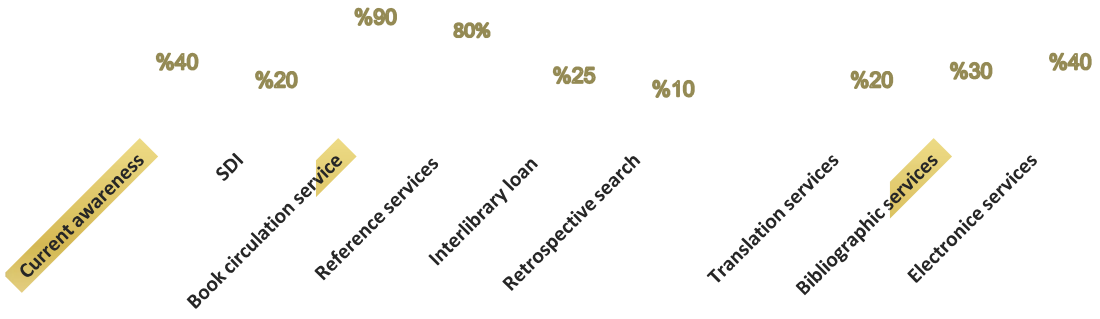


Fig.4.33: Type of services offered

4.3.18 Priority and Performance Evaluation

Asking library patrons about existing and possible library services is one form of client satisfaction survey that can have an immediate and positive impact on users. As a matter of fact, users will benefit because the library will clearly understand what services have the greatest positive impact on their personal or professional lives. The library, in turn, can benefit from such a survey in that it will identify what services are most significant and understand how the users rate the library's current performance for each service.

In order to do so, library users were asked to indicate the priority the library should give to each actual or possible library service, on a 1 to 5 Likert scale. Following this the clients were asked to rate the library's performance in providing the service. The order of the library

services in the second question was different from the sequence of the first question. This obliged the respondents to read and rate each library service carefully. All services were identified using the letters of the alphabet. Table 4.38 describes the services and their assigned letters.

Table 4.38: Identification letters used for library services

Type of services	Letters used for identification
Translation services	TS
Interlibrary loan services	IL
Current awareness services	CAS
SDI services	SDI
Electronic services	ES
Retrospective search services	RSS
Reference services	RS
Bibliographical services	BS
Book circulation services	BCS
Timely information services	TIS
Availability and accessibility of staff	AAS
Accuracy of information services	AIS

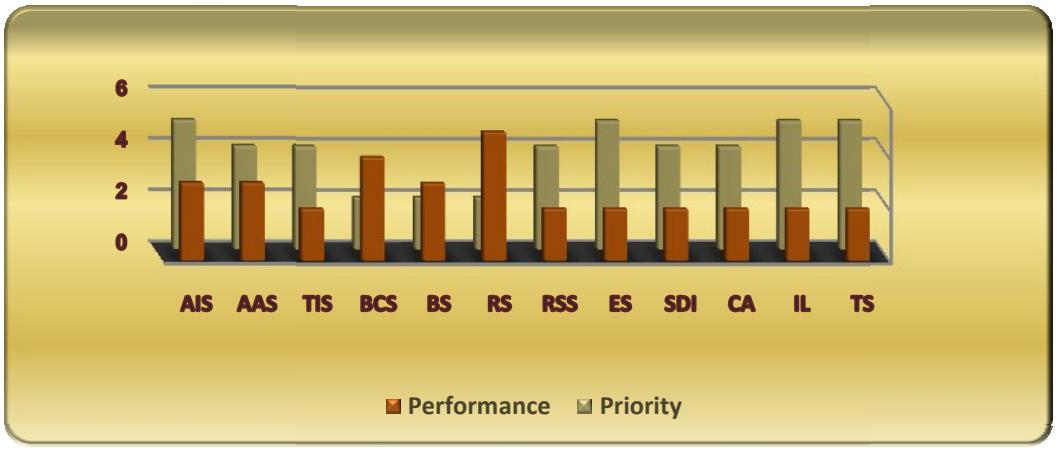


Fig. 4.34: Priority and performance results

4.3.19 Priority and Performance Results

Figure 4.34, above shows the results of the priority and performance evaluation. For the first six services, the priority assigned by the library's users exceeded the library's ability to deliver the expected level of service. For the services with lower priorities, actual performance exceeded expectations in only three cases. For the last three services, again the priority assigned by the library's clients exceeded the library's ability to deliver the standard level of service.

4.3.20 The Impact of the Shortage of Library Services on Library Users

To discover the effect of the deficiency of the aforementioned services, respondents were asked to indicate which area would be badly affected by the absence of these services. It is easy to see a profound effect from the absence of library services as demonstrated in Figure 4.35, which shows that a fairly high proportion of library clients (35%) believe that the absence of such services would have a negative influence on research and development. Just under a third of users surveyed (32%) assume that the deficiency of library services would have a negative effect on their work performance, whereas a very small number of library users (2%) believe that the shortage of such services would not necessarily have any negative effect, and about one-third of library users (31%) consider that the absence of library services would have an adverse effect on the organisation.

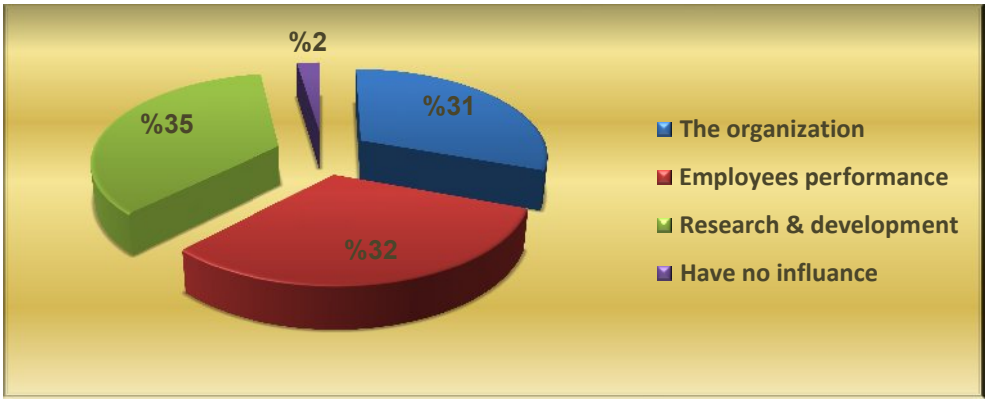


Fig.4.35: Impact of shortage of library services

4.3.21 Ways of Acquiring Information by Library Users

Respondents were requested to explain how they would satisfy their information needs if the organisation did not have a library or information centre.

Table 4.39: Ways applied for satisfying informational needs

Ways of acquiring information	Percentage
Using internet yourself	42%
Using databases yourself	7%
Using reference material in another library	31%
Other professional colleagues	16%
Would not get research materials	4%

The responses, as illustrated in table 4.39, show that 42% of users surveyed would use the internet by themselves in order to satisfy their information needs. This reflects in fact that there is good proportion of users who are able to use the Internet, which may be considered a

positive indication of Internet use. Nearly a third of users surveyed (31%) stated that they would use other libraries materials in order to satisfy their informational needs, while 16% of users surveyed would rely on the assistance of their professional colleagues for acquiring information and 7% of them would use available databases. Very few of the users surveyed (4%) claimed that they would not obtain the required information if the organisation did not have a special library or information centre.

4.3.22 Level of User Satisfaction With Library Services

As a final question, users were asked to indicate their level of satisfaction with the services provided for them from their libraries. Figure 4.37, illustrates that a fifth of users surveyed (20%) were satisfied with the services provided. Just over one-fifth of users surveyed (21%) expressed some dissatisfaction and more than half of the respondents (59%) fell in between the two.

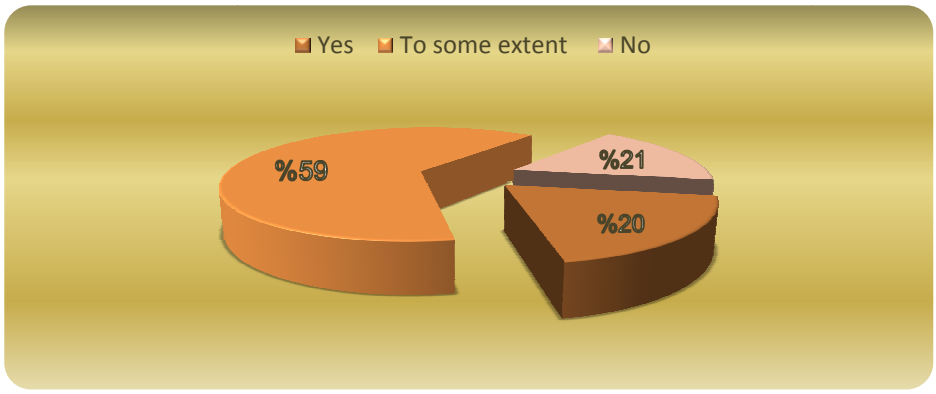


Fig.4.36: User satisfaction with library services

To discover user dissatisfaction with library services, library patrons were given a table listing a number of reasons and were requested to choose the reason for their dissatisfaction. In addition, respondents were also asked to fill in a blank space provided in case there were other reasons they wished to specify.

Table 4.40: Reasons for user dissatisfaction

Reasons for user dissatisfaction	Percent
Librarians are unfriendly	8%
Library materials are not well organised	15%
Library collections do not meet needs	19%
Unappealing facilities	9%
Library services are weak in general	15%
Librarians are not sufficiently qualified and lack technical knowledge	15%
Difficulty in finding what you looking for due to a lack of quality retrieval	19%
Total	100%

Table 4.40 above demonstrates reasons for user dissatisfaction. It is noticeable that the library's collection is one of the most important reasons for user dissatisfaction. Just under a fifth (19%) of users surveyed complained about the library's collection. This affirms the information in Table 1.5, which demonstrated that a considerable number of library users pointed to a lack of up-to-date information resources. The second most essential reason for user dissatisfaction related to difficulties in finding what users were looking for due to a lack of good retrieval tools. This shows that a high proportion of users believed that special libraries were suffering from a shortage of well-qualified librarians responsible for organising library materials. Fifteen per cent of library clients pointed to a weakness in the library's services in general and another 15% indicated a shortage of librarians with technical knowledge. Just under a tenth (9%) of the users surveyed attributed their dissatisfaction to unappealing facilities and 8% believed that the library staff were unfriendly when dealing with library users.

4.3.23 Special Library Users and Computer Literacy

The advent of the Internet and World Wide Web has brought not only a dramatic change in library sources and materials but has also changed the way of providing library services as well as user expectations. Nowadays, library users in general need to have the ability to make the most of their library services by taking full advantage of the services on offer. However, to reap such benefits, library clients as individuals must be information literate and at the same time computer literate. To be information literate, a person must be able to recognise when information is needed and have the ability to locate, evaluate, and use effectively the needed information. Computer literacy refers to the ability to use applications rather than to program. It is the level of familiarly someone has with computers. In order to have an indication of the range of information literacy of special library clients, the user questionnaire included some questions regarding this topic. Respondents surveyed were asked to indicate to what extent they were knowledgeable in the use of computers and how did they learn to use computers. Received responses showed that half of users surveyed (50%) had a considerable knowledge of the use of computers, while 17% of users surveyed considered themselves to be experts in the use of computers. A small percentages of users (12%) claimed to have adequate knowledge in this domain, and just under a fifth (19%) of special library users (19%) had minimal knowledge. A very small percentage (2%) of special library users in the sample had absolutely no knowledge in the use of computers.

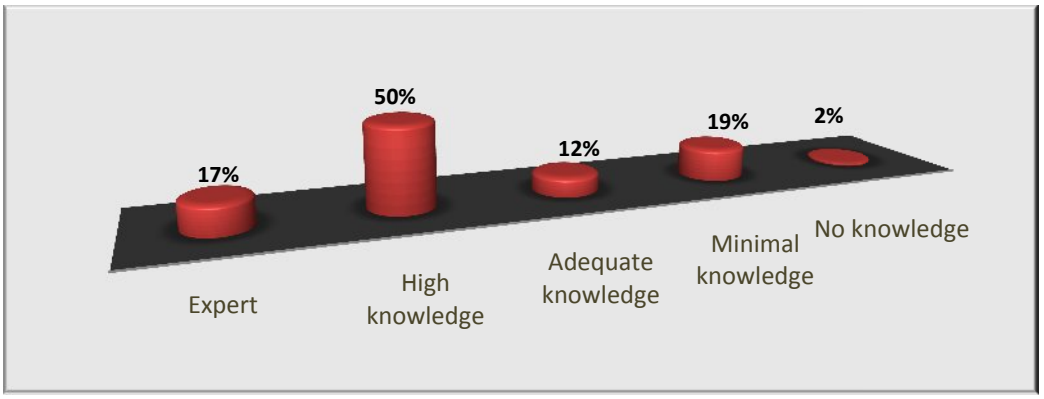


Fig.4.37: How knowledgeable are special library users in the use of computers

4.3.24 How Users Learn to Use Computers

Library users were asked how they learned to use computers. Received responses demonstrate that 43% of users surveyed claimed to be self-taught in the use of computers. Over a third of special library users 37% learned to use computers by attending one of the computer courses that are available as private courses all over the country. Around 6% of users stated that they had learned to use computers through the educational system and 14% learned to use computers through the assistance offered by their professional colleagues.

4.3.25 Frequently Used IT Applications

Users were requested to indicate the most regularly used IT applications. The most striking feature of Table 4.41, is that it demonstrates that more than one-third of users in the selected sample (35%) use computers for Internet surfing. Just under a fifth (19%) of the users surveyed made use of computers for spreadsheets, while 15% of special library users exploited computers for communications and e-mail. A tiny percentage of users surveyed (2%) used computers for programming and website design. A few (4%) of the users surveyed used computers for simulations and program design.

Table 4.41: Frequently used IT applications by users surveyed

IT Application	Percent
Language programming	2%
Spreadsheet	19%
Word processing	11%
Surfing the net	35%
Data processing	12%
Web design	2%
E-mail	15%
Simulation and program design	4%

4.3.26 How Knowledgeable are the Library's Patrons in the Use of the Internet?

Respondents surveyed were asked to indicate the extent of their knowledge in the use of the internet and how they learned to use it. Responses show that just over half of users surveyed (56%) had a wide knowledge of internet use, while (15%) considered themselves experts in the use of the Internet. While a small percentage of users (8%) had adequate knowledge in this domain, 15% of special library users had minimal knowledge. A small percentage (6%) of special library users in the selected sample had no knowledge whatsoever of Internet use.

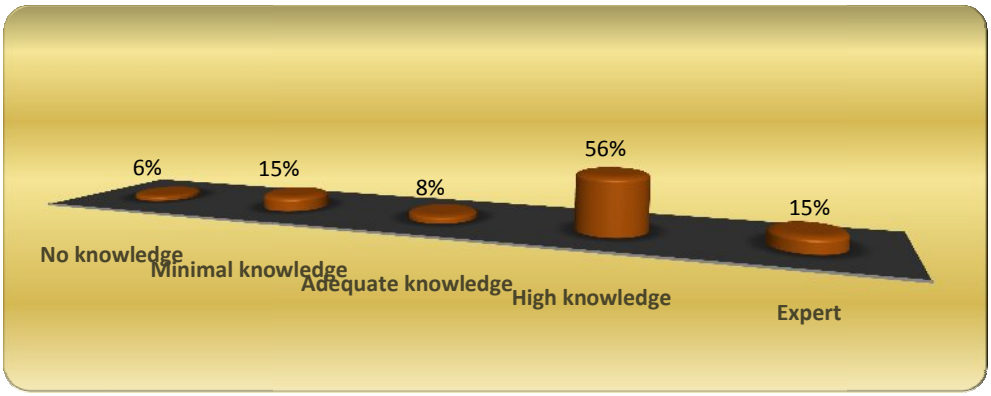


Fig.4.38: How knowledgeable are patrons in the use of the Internet?

4.3.27 How Users Learned to Use the Internet

Library users were asked how they learned to use the Internet. Responses showed that over a half of users surveyed (53%) claimed to be self-taught in the use of the Internet. Less than a fifth of special library users (16%) learned to use the Internet by attending courses. Only 9% of the users surveyed stated that they had learned to use the Internet through the education system and 14% learned to use the Internet through the assistance offered by their professional colleagues.

4.3.28 For Which Type of Information is the Internet Commonly Accessed

The users surveyed were asked to indicate which types of information the Internet is used to access. Figure 4.39, demonstrates that just under a half of the users (47%) accessed the internet to search for catalogues of goods and services. Government publications was the second most commonly accessed type of information from the users' perspective, since 17% of users surveyed accessed the internet to search for official publications. University library catalogues ranked third as commonly accessed types of information by special library users, at (16%). Very few (2%) users accessed the internet for alerting services followed by organisation home pages (6%) and electronic journals (12%).

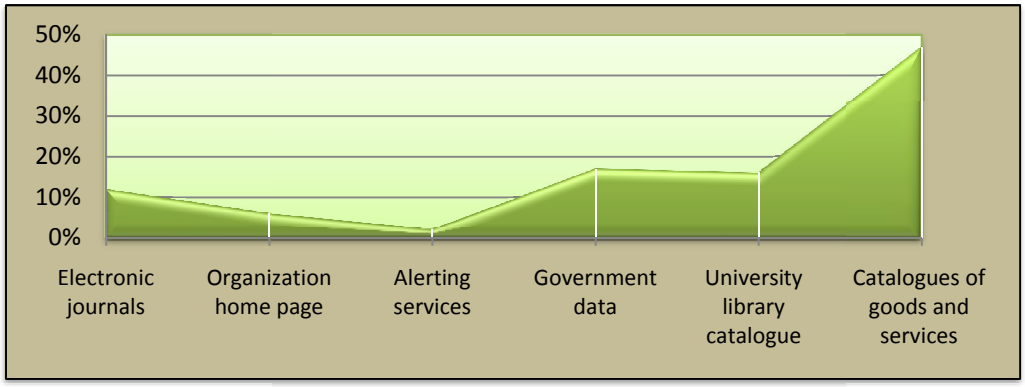


Fig. 4.39: For what type of information is the Internet most commonly accessed

4.3.29 To What Extent are Special Library Users Computer Literate?

In order to find out to what extent special library users are computer literate, respondents were given a list of IT terms and applications and were requested to identify to what extent they were familiar with the given terms and applications on a five point scale. Tables 4.42, and Figure 4.40, below demonstrate that the number of skilled users in such applications is not high, apart from Microsoft Office, as the percentage of expert users in this application accounted for 37%. There was a high proportion of special library users who were not acquainted with IT terms such as virtual reality, virtual environment and electronic resources. About a third of special library users in the selected sample were knowledgeable in the use of the internet, chat, and hypertext. The overall picture revealed that the users surveyed were familiar with IT terms and applications as the number of library clients who indicated having adequate knowledge in the use of such applications was fairly reasonable. However, it is essential to point out in this context that a considerable number of users surveyed lacked knowledge in the use of some IT applications.

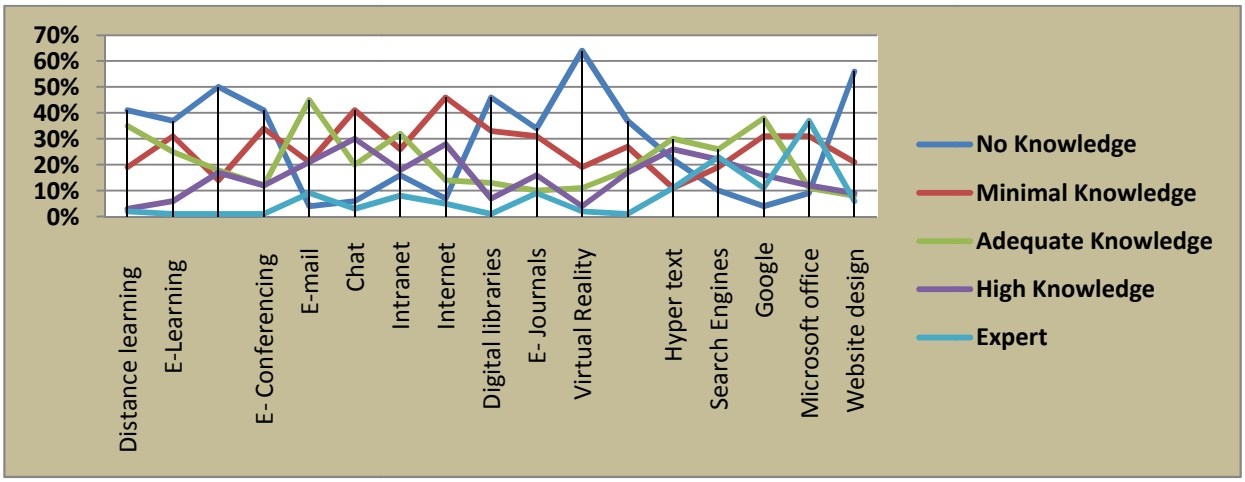


Fig. 4.40: Familiarity of certain IT terms and applications by users

Table 4.42: Familiarity of certain IT terms and applications by users

IT applications	No Knowledge	Minimal Knowledge	Adequate Knowledge	Considerable Knowledge	Expert
Distance learning	41%	19%	35%	3%	2%
E-Learning	37%	31%	25%	6%	1%
Electronic resources	50%	14%	18%	17%	1%
E- Conferencing	41%	34%	12%	12%	1%
E-mail	4%	21%	45%	21%	9%
Chat	6%	41%	20%	30%	3%
Intranet	16%	26%	32%	18%	8%
Internet	7%	14%	46%	28%	5%
Digital libraries	46%	33%	13%	7%	1%
E- Journals	34%	31%	10%	16%	9%
Virtual Reality	64%	19%	11%	4%	2%
Virtual Environment	37%	27%	18%	17%	1%
Hyper text	22%	11%	30%	26%	11%
Search Engines	10%	19%	26%	22%	23%
Google	4%	31%	38%	16%	11%
Microsoft office	9%	31%	11%	12%	37%
Website design	56%	21%	8%	9%	6%

4.4 Summary

This chapter has presented the anaylisis of the data which were gathered from the questionnaires distributed to a sample of special library users and a sample of librarians who are responsible of running special libraries in Libya. The second phase of this research was based on the findings of the first phase and involved the design of an appropriate digital library service to assist in developing current services. This chapter has dentified the problems and the obstacles present in current services. It has also indicated that information services for special library users in Libya are poor and not well developed because they suffer from a general weakness in their equipment, ICT infrastructure, resources, and staff making them unable to meet their obligations towards their users. The following chapter presents the findings from the first survey and discusses the results. At the end of the next chapter the researcher suggested a number of recommendations in order to raise the standard of special library services in Libya.

CHAPTER 5: RESEARCH FINDINGS

The previous chapter presented and analysed the results of questionnaires distributed to librarians, managers of information units, and special library users in Libya. Having evaluated the current state of information centres and special libraries in Libya through this study and identified the problems and the obstacles present in current services, this chapter presents the findings from the first survey and discusses the results.

5. 1 General Information

The concept of the special library in Libya, so far, has not been adopted any significant degree by strategic planners and decision makers in Libyan organisations and institutions. This has had a negative impact on the number of libraries that were supposed to have been established in the country, in comparison with numbers in developed countries. For instance, the number of special libraries in the United Kingdom reached over nine hundred in 1998 whereas the number of special libraries in Libya, according to the directory of special libraries, was only 169. This figure also includes faculties and college libraries which are generally considered university branch libraries. This means that the actual number of special libraries in Libya did not exceed 140 libraries and information centres. This figure reflects the disparity in numbers of special libraries in institutions between Libya and developed countries.

Despite the lack of awareness of the concept of the special library in Libya, it is hard to deny that special libraries are still spreading across the country. Moreover, the number of established libraries in the country is on the increase as shown in the following table:

Table 5.1: Number of special libraries in Libya between 1950 – 2007

Period	Number of libraries	Percent
1950 - 1959	10	6%
1960 -1969	7	4%
1970 - 1979	24	14%
1980 -1989	50	30%
1990 - 1993	7	4%
1994 -2007	71	42%
Total	169	100%

- Special libraries in Libya normally offer their services exclusively to the staff of the parent organisation. However, a number of special libraries provide various services to external users who also vary in gender, age, and qualification.

5. 2 Staffing

- Special libraries and information centres are suffering from a shortage of managers who specialise in library and information sciences. Just under a half of libraries in the selected sample (47%) were managed by someone with a qualification in library science.

- The lack of specialists who are qualified in library science has had an impact. It has affected the value of the services offered by these libraries negatively, especially at the level of technical services and at the level of users' services. Reasons behind the shortage of qualified librarians could be one or more of the following;

- Unwillingness of a proportion of library science graduates to work in special libraries due to a lack of incentives such as proper position on the basis of their qualification and good salary.

- Absence of regulations underlining the recruitment process in special libraries, that would prevent any non-specialists from holding technical positions in these institutions. This was evident from the responses which indicated that only a few libraries in the selected sample had a written policy document to regulate the recruitment of library staff members and information specialists. The success of staffing will depend greatly on a defined recruitment programme.

- Executives in organisations and corporations covered by the research would seem to have a low awareness of the importance of appointing specialists in library science to take over work assignments. This has led to the existence of a high proportion of library staff who are not qualified above secondary school level and who do not posses adequate knowledge in the field of library science.

- The study has revealed a clear shortage of subject specialists in special libraries and information centres in Libya, despite the importance of qualified library personnel. Only 17% of the staff in the selected sample were found to be subject specialists which cannot be considered a positive indication owing to the role this category has to play nowadays in offering high standard services to end users. Obviously, it is desirable that library staff members should have at least a basic knowledge of the field, which would help to meet the clients' needs more effectively.

- The study also revealed a shortage of library staff, with qualifications in library science in the sector of highly-specialised institutes.
- Most of the existing staff in special libraries were not found to be competent with IT applications. The study has exposed a lack of competent and highly specialised staff who are well skilled in the use of IT applications. This skill set however is necessary for providing efficient services. These indications demonstrate a shortage of qualified and well skilled staff who are supposed to take the lead in providing high quality services to clients in a new electronic environment with an increasing amount of scientific and technical literature.
- While most of the sample of researched staff in the research and documentation centres sector had a qualification in library science, and some of them had majored in subjects relevant to the centre, highly-specialised institutes suffered from a shortage of specialists in library science, and over half of the group did not even have a qualification relevant to the specialisation of the organisation.
- Despite the availability of training courses for special library staff – as confirmed by managers interviewed – the majority are still unable to deal with IT applications, especially in sectors like law and health. Librarians at highly-specialised institutes in particular do not possess an appropriate set of skills in this domain. Therefore, they cannot offer any kind of service that depends upon the use of IT applications.
- Special libraries are passing through a phase of dramatic changes due to the ongoing challenges being posed by information and communication technology. Accordingly, they are challenged to explore new ways to accept and address the changes in order to be able to serve experts, scientists, and research workers, who demand specialised services that operate faultlessly and accurately. Most of the scientific information today is available in a new variety of formats like CDs, DVD, and Internet web sites etc. which require knowledge of specialised information handling techniques. Therefore, a qualified, well-trained staff with modern technological equipment should be available to enhance technical services at the standard level.
- Special libraries in Libya still suffer from a shortage of adequate staff who are supposed to be able to run special library services in an effective manner. This is due to the scarcity of librarians with a subject qualification who might specialise in specific subjects in addition to postgraduate LIS. This category of librarians are usually able to analyse documents and create the necessary

subject headings that are needed for cataloguing, indexing and abstracting services in addition to their ability to provide highly rated services for end users.

- Although the total number of the staff in the selected sample of libraries seems to be appropriate and sufficient in reality, this was not the case. This was evident as 38% of staff are not qualified librarians and have no qualification at all in library science. Furthermore, this considerable proportion of librarians have not even majored in any subject relevant to the parent organisation which means that special libraries are full of staff who cannot offer anything of worth to patrons. This was evident from users' responses, which indicated that there is a shortage of librarians with technical knowledge and have contained complaints about special libraries' collections that they believed to be badly organised.

5. 3 Collections

The research has revealed that all libraries in the selected sample have acquired a variety of information resources with differences in the quantities of available formats. Conventional materials, which consist of print materials, were the most common feature of existing stock. It is also clear that special libraries have acquired very limited numbers of digital materials and electronic resources. Despite the availability of audio-visual materials in most of the selected sample of libraries and information centres, the use of such materials is still not up to a good level since libraries are not sufficiently staffed with skilled personnel and the equipment necessary for accessing such materials.

- The survey also revealed a scarcity of scientific journals and serials, which are considered one of the most important information resources due to their significant role in scientific research. Despite the importance of scientific journals as the backbone of research activities, the proportion of journals' titles did not exceed 1% of the total stock.

- The research also exposed a clear weakness in the number of books and reference materials in the selected sample. Although a number of libraries have built a good collection of books, such as the Libyan Jihad Centre for Historical Studies, still a great number of libraries suffer from a shortage of books in both Arabic and English. For example, the collection of the Legal library in Derna did not exceed 1550 titles. The collection of the Library of Misrata general hospital also did not exceed 650 titles in either language, whereas the guidelines published in 2000 by IFLA concerning libraries serving hospital patients, elderly and disabled, in long-term care facilities, has recommended at least 3000 books for hospitals with 500 beds.

- The annual increase rate in stock is supposed to reach at least 5% according to IFLA guidelines. In reality, the annual growth rate of books in the selected sample did not reach that rate. The calculation of growth rate has revealed a rate of less than 2% in all libraries which cannot be considered a positive indication as special libraries already suffer from weaknesses in their collection of books. Therefore, the annual increase must be reconsidered along with the acquisition process.
- Owing to the significance of Masters dissertations and doctoral theses – which are considered to be valuable, primary sources of research results and are usually original research produced by academic institutions – the collection of a special library is supposed to contain such sources of information for the benefit of research workers within the parent organisation. In fact, the proportion of such materials in all libraries did not exceed 1% of the total stock, which is too low.
- With regard to special materials such as standards and specifications, conference procedures, patents, government publications and reports, the research has revealed a shortage of much of these materials in some sectors and restricted availability of them in other sectors. Special materials are more generally available in the energy sector except patents, which are not available in any sector covered by this study, despite their importance. Although the type of collection in a special library would depend on the nature of the activities of the parent organisation, special materials of various kinds should have a presence in any collection regardless of the type and nature of the organisation.
- Despite the fact that books are not the core source of information for special library users, this source of information represents 41% of the total stock in the selected sample of special libraries and information centres. The high percentage of books in comparison with non-book materials in the selected sample does not indicate a healthy phenomenon, but rather undeveloped acquisition processes. Special libraries are supposed to acquire a variety of resources that can assist in satisfying users' diverse needs and requirements.
- As the concept of resources ownership is changing, nowadays digital materials and electronic resources are becoming more and more important than ever before. Accordingly, there is more emphasis on making electronic resources available anywhere, rather than physical collections at specified points. Despite the importance of the availability of such materials, special libraries in Libya are still a long way from acquiring digital and electronic resources. The survey has revealed that only two libraries in the selected sample had electronic and digital resources.

What is more, existing digital materials represent less than 4% of the total information resources acquired by these two special libraries. This would means that fifteen out of the seventeen special libraries and information centres in this study were still relying upon traditional resources in providing users' services whereas there is a global trend among special libraries to gain and acquire digital materials. The reason for not acquiring electronic and digital resources could be one or more of the following:

- The concept of digital materials and electronic resources is not, so far, well understood by managers of special libraries and information units in Libya.

- Lack of financial support and other funding problems, which is one of the major problems faced by special libraries in Libya.

- Lack of professional staff who can deal with digital materials and exploit the advancement of today's technology in offering high standard services to targeted end users.

- Absence of policies which regulate the use and implementation of digital and electronic resources in almost all special libraries. This was evident from responses which revealed the lack of any policy regarding the use of digital materials in the selected sample of libraries.

- Aside from digital and electronic resources, the research has revealed considerable problems within special library collections in Libya. There is also a lack of up to date information sources in many libraries and information units. Just under half of users surveyed (43%) pointed to this issue as a significant problem. Therefore, this matter has to be considered when evaluating special library services.

- There is a problem within the coverage of the present collections, as about a quarter of users surveyed (23%) complained about subject coverage and the absence of subject balance that is supposed to exist in order to satisfy a wide range of user requirements and wants.

- Lack of materials of interest is also another problem discovered by the survey as a good proportion of special library users (24%) complained about the lack of library materials that interest them and satisfy their needs. All of them mentioned that they were negatively affected by the poor collections of the special libraries and had expressed their unwillingness to exploit their resources to the utmost. This was evident from users responses which revealed that just under a fifth of special library users (19%) were of the opinion that special library collections were very unsatisfactory while 23% considered holdings as unsatisfactory.

5. 4 Special Library Services in Libya

5. 4. 1 Technical Services

Information services form the cornerstone for any library because library operations start with selection processes, then prepare technical services and end with library activities and services aimed at upgrading information services for users. Therefore, information services are an effective tool for measuring the effectiveness, and therefore indicate the potential, of any informational institution. Regarding information services in the sample, the survey has revealed some noteworthy remarks. In what follows some of the most important findings that the survey revealed on this particular, are presented:

- The research has revealed that users preferences and interests were ignored in the process of selecting library materials, and their suggestions have had little impact on the process of material selection. Neglecting users opinions in the supply and selection of library resources has resulted in needs and requirements being poorly represented. Accordingly, special library users were not satisfied with the coverage of existing materials and library resources have suffered from a shortage of materials that are consistent with the needs of users.
- A considerable number of librarians found it difficult to acquire electronic resources because purchasing or accessing such materials through the internet requires different skills such as negotiation skills and wide knowledge about dealing with e-resources vendors. Therefore, librarians found dealing with vendors too complex as most of them do not possess negotiation skills and, of course, IT skills which are necessary when dealing with these vendors.
- Owing to librarians reservations regarding the issue of accepting books and other library materials from other informational institutions, special library collections have not developed to the sought level. This has been exacerbated by the lack of other means of supply, such as exchanging of materials with other organisation and institutions.
- The lack of acquisition policies that control the acquisition process has impacted the operation of supplying special libraries with information resources in a negative way and stopped libraries from acquiring information resources that are consistent with the needs of clients.
- As cataloguing and classification are considered key to organising information in libraries and information centres more attention should be given to these tools to enable users to make the most of the library holdings. Special libraries in Libya still suffer from a lack of efficient retrieval tools, as many of them still rely on the primitive card catalogue which has been made obsolete

by more sophisticated tools, such as the OPAC, which allow their collections to be browsed and searched remotely. The deficiency of any adequate classification system in some special libraries, particularly in the sector of highly specialised institutions, has made the matter worse. A number of librarians have reported that they use a special numbering system as (home grown classification) for organising library collections and for locating materials which is far removed from any modern classification system.

- With regard to indexing and abstracting services, which are considered essential services for special librariy users, the survey revealed that only three special libraries in the selected sample provided such services despite their importance.
- The provision of a bibliographical service was found to be limited to some special libraries as just over the half of the selected libraries (55%) reported the provision of such services – as affirmed by interviewees. The rest of the libraries and information centres were not capable of offering such a service due to the lack of qualified librarians and information specialists.
- Special libraries and information centres usually seek and aspire to provide adequate and efficient services to users for the advantage of the parent organisation through diverse resources that are expected to satisfy and meet users' requirements. Information resources and library collections in general would not be usable unless there were powerful retrieval tools available for users. Failure to organise information resources so that they can be retrieved with ease will lead to wasting a great deal of users' time – whereas saving the time and effort of users and research workers is considered one of the most important factors in modern-day services. Therefore, supplying information units with well-skilled and qualified staff who are able to play their role fully in the domain of up to date technical services is essential and should always be at the top of libraries' priorities. However, special libraries in Libya still suffer from a shortage of adequate staff who are capable of running special library services in an effective and efficient way due to the scarcity of well-qualified librarians.

5.4.2 User Services

With respect to user services, which may be considered the corner stone and main objective for all kinds of libraries, the survey produced the following findings:

- The research has highlighted a regrettable and disappointed state of user services, which is a reflection of special library weaknesses and inability to realise their duties and undertakings towards their potential users. This in its turn has impacted negatively on the level of services and activities which they have to deliver, in addition to numerous problems which should have been overcome long time ago.
- In terms of current awareness services – which are designed to keep research workers up to date with current information to support their research, teaching and studies – a considerable number of the selected sample of special libraries were not able to provide such services despite awareness of the significance of the provision of such services. This was evident from responses which indicated that only 40% percent of users have benefited from current awareness services provided by their special library whereas it is vital in this information intensive internet age to provide this service in order to assist end users to manage the amount of information.
- Regarding selective dissemination of information (SDI), the survey has shown that out of the 17 libraries surveyed only 5 libraries provided an SDI service to their clients. This indicates that the service is not yet widely spread and consequently very few users can benefit from such service.
- Research workers do not want to miss anything published in any language in their area of interest. However, because literature is being produced from all over the world in many different languages, the provision of translation services to users is always vital. Special libraries are generally expected to provide such services. The analysis of the user questionnaire has shown a great demand for translation services. It has also demonstrated that, in spite of the considerable number of users who have expressed their needs for such a specialised service, very few users have been able to benefit from such a service as only one library in the sample reported its availability. Furthermore, priority and performance evaluation has shown that demand by special library users exceeded the libraries actual ability to deliver the expected level of translation services. This means that there is a gap between what users want and what they actually get. The reasons behind a lack of such a service are:

- Lack of resources, both financial and human.
- Lack of a special section for translation in special libraries as well as in the organisation to which the library is attached.
- Absence of corporation with commercial offices for translation in addition to a lack of funding and sufficient allocation.

- Almost all special libraries in the sample provided reference services to their patrons except the library of Misrata general hospital. Only two libraries offered a sort of alternative reference service; namely the central library of the National Oil Corporation which provides, besides the normal traditional reference desk telephone, an e-mail reference service, and the library of Economic Science Research that also offers a telephone reference service.

- There was lack of any reference service that used information technology applications, as most special libraries in the sample were still unable to provide modern reference services to their clients. Therefore, the conventional reference desk was a predominant feature of the current reference service.

- Electronic services in the selected sample were still not well developed and not well understood by librarians. Due to budget constraints and financial allocations which were often not sufficient to purchase and acquire electronic resources or to equip libraries with the IT necessary for providing electronic services, special libraries were still incapable of offering such services to users. Although electronic services are being provided by libraries, regardless of their nature and their users because it proved to be cost-effective, special libraries in Libya were still struggling to provide electronic services in order to raise their services to the desired level and to gain user appreciation.

- The survey has revealed that electronic services provided by special libraries in Libya are not well formed although there is a consensus among information units and special libraries in Libya on the necessity of providing such services to users.

- Despite the availability and the provision of electronic services by some special libraries in the selected sample, the overall picture of these services is poor as much has still to be done to reach the right level. It is also not enough to provide only internet access as there are many other electronic services that can be provided to improve research activities in organisations and corporations.

- It is a fact that not all special library users are very good at using computers. Nevertheless, a good proportion of them – in this study 67% – considered themselves as knowledgeable in the

use of computers and the internet. This fact leads to a very important question: why is there such a limited use of electronic resources and such a common reliance on using traditional and print materials, instead of relying on accessible resources like electronic materials? The answer to this question could relate to the lack of electronic services as well as the inability of libraries to deliver the required electronic services to the advantage of special library users.

- In spite of the importance of interlibrary loans as stated by the users surveyed, the provision of this service was still limited to a small number of special libraries and information centres. Priority and performance evaluation has shown that the importance assigned by special library users exceeded the ability of libraries to deliver the expected level of this sort of service.

5. 5 Budgeting

As the budget is one of the most essential components required for running any type of library in an effective and efficient way more attention should be given to this element to ensure continuity of services to end users and to meet their changing needs and requirements. Regarding the financial allocation of libraries covered by this research, the survey has revealed the following points:

- A shortage of finances has affected the sample of information units and special libraries in a negative way, and hindered them from managing their work and providing specialised services in an efficient manner. At the level of acquisitions, which are considered to be the back bone of technical services, these libraries have not been able to enrich their holdings and collections in an acceptable manner to meet the diverse needs of users. Lack of finances has also meant a lack of subscriptions to periodicals and scientific journals, which are considered one of the most essential materials for special library users.
- At the level of physical equipment the shortage of finances has deprived the sample of libraries from being equipped with modern and sophisticated technical devices and equipment.
- A considerable number of special libraries (71%) did not have a separate budget. Only 4 out of the 17 surveyed libraries had a separate budget. Accordingly, most special libraries suffered from a shortage of sufficient finances which affected their performance badly.
- In terms of staff, the availability of adequate financial support is critical for attracting qualified personnel who are able to perform the technical services to the fullest extent, in addition to providing excellent and diverse services capable of meeting user needs. Due to a lack of

incentives, special libraries and information units were not able to attract professionals to raise their services to the standard level.

5. 6 ICT Infrastructure

Whilst special libraries in Libya suffered from poor ICT infrastructure, their counterparts in developed countries have benefitted from sophisticated ICT which has proved to be vital for success and development. Special libraries need to exploit the technological revolution to the maximum and to make use of IT that are considered the basis for any development in contemporary society. Investigating this area revealed the following results:

- Eighty eight percent of organisations which responded to the questionnaire used computers for some aspect of their library and information services. ICT was used for a range of office work and other applications. These tasks generally included e-mail, word processing, spreadsheets, and database management systems.
- The majority of the special libraries in the sample had basic hardware facilities such as computers, printers, etc. The libraries attached to oil corporations and companies had more hardware facilities including scanners, printers, and CD-ROM towers, etc. A high proportion (90%) of the selected libraries reported the need to have more computer terminals and devices such as printers and scanners to provide electronic information resources and services. Libraries attached to higher specialised institutes had very poor hardware and software which was inadequate for library automation and ICT applications. As the cost of hardware is decreasing day by day, special libraries should be equipped with proper ICT in order to be able to provide electronic services that would satisfy users' needs and requirements.
- A small number of special libraries (42%) made use of computers for managing their collections such as the library of the Central Bank of Libya, which used computers for lending services, data base management, storage and retrieval of information, and for providing electronic library services.
- Forty seven percent of surveyed libraries were connected to the internet, some through dial up connections and some through local area connections. Despite the availability of internet connection none of the libraries surveyed had their own website. However, some of them had a link to the home page of the parent body such as the central library of the National Oil Corporation or the library of Jihad Centre for Historical Studies.

- The number of computers connected to the internet in libraries attached to the energy sector was higher than the number of computers in other sectors.
- As all the operations in a library can be automated to achieve more efficient and effective functioning and for providing outstanding library and information services, special libraries are being encouraged to adopt some ICT applications that assist in automating specific operations according to their priorities. In fact, this is becoming a predominant feature of today's libraries everywhere in order to raise the standard of offered services and to satisfy user needs and requirements. Despite the importance of automation of library operations, and in particular the automation of library catalogues, it was found that only four libraries out of the seventeen surveyed had automated their library catalogue. A good proportion of the selected sample of libraries had no OPAC. Regarding acquisition, the survey revealed that the majority of acquisition processes were purely manual. Serials control was also found to be manual: none of the sample relied on an automated system for handling their serials.

5. 7 Recommendations

Having examined the findings of the study the following recommendations are suggested in order to raise the standard of special library services in Libya.

As regards staffing

- Reconsider the regulations underlying the recruitment process in special libraries in Libya and develop a new framework under which the appointment of qualified professional staff will be established according to the needs of every library.

- Special librarians play a vital role in every organisation. Their skills in analysing, packaging, and disseminating information are important factors in any organisation's decision-making process. Therefore, provision of qualified staff is a necessity for running special libraries and must be considered at a strategic level.

- There is a need for providing appropriate salaries to attract and encourage a qualified and well-skilled workforce to work in special libraries. The libraries subjected to this study are suffering from a scarcity of qualified librarians and subject specialists.

- There is a need for providing qualifying courses to develop the silks of existing staff and their performance in line with the needs of the service. It is also essential to provide courses leading to qualifications in the use of ICT applications in order to facilitate special library personnel acquiring the skills required for the provision of electronic services. The training of librarians and information professionals is needed so they can meet the challenge of providing information services in the new era. There should be an emphasis on providing ICT courses to assist existing human resources in acquiring certain skills such as:

- An in-depth knowledge of the information-seeking behaviour of the user and at the same time an ability to organise data according to this knowledge.
- An understanding of modern information technologies.
- An in-depth focus on the importance of IT and how people can benefit from using IT in daily life.
- An in-depth focus on the monitoring and evaluation of e-resources use.
- An understanding of PC troubleshooting for library personnel.
- An in-depth focus on licensing and negotiation skills required to deal with e-resources vendors.

As regards collections

- Provision of conventional and modern information resources, according to the needs of users, is a crucial issue and should be done through the involvement of library clients in the selection processes in order to meet their diverse needs and requirements.
- There is a need to provide information resources in all forms and grow collections more rapidly.
- There is a need to improve the balance of the content of library collections as well as placing emphasis on providing materials that meet the diverse requirements and needs of users and to avoid providing material on only one area.
- Subscription to scientific journals and serials is a necessity for the development of research activities in the organisations and institutions subjected to this study. Therefore, ensuring the availability of adequate and sufficient financial allocation for the provision of serials should be stressed.
- Acquiring up to date information resources is essential to enable users to use the latest developments in all fields of interests.
- There is a need to speed up the provision of reference works to give library personnel the capability to provide adequate reference services.

As regards library services

- There is a need to improve the administrative, technical and organisational level of information centres and special libraries according to the scientific principles in the field. Lack of a documented policy used by special libraries to base their services on has badly affected the level of performance.
- There is a need to develop acquisition policies and strategies that will ensure the success of selecting relevant library materials.
- Starting to provide current awareness services, selective dissemination of information, online search services and enabling users to consult databases at regular intervals may contribute to raising the standard of scientific research and pushing the wheel of scientific advancement.
- There is a need to speed up the provision of electronic services, through finding suitable ways to provide these type of services, to speeding up the creation of digital libraries to improve the ongoing research projects.

- Drawing a steady and durable policy for developing information services is an important matter in order to improve the services presented to target users.
- There is an urgent need to supply libraries and information centres subject to this research with the equipment needed for displaying audio-visual materials in order to enable target users to make the most of available non-print materials.

As regards funding

Financial support for special libraries subject to this study was found to be inadequate. This has caused many constraints with regard to purchasing library resources and materials needed to satisfy user requirements. Therefore, publishing of documented policy that ensures sufficient allocation of funds for the acquisition of library materials should be considered at strategic level.

- There is an urgent need to supply information centres and special libraries with adequate funding so that they can provide better services for target users.
- Lack of adequate finances has also meant that there are not sufficient subscriptions to periodicals and scholarly journals which are considered one of the most essential materials for special library users. Therefore, it is recommended that adequate allocations should be made, to assist libraries subject to this study to subscribe to periodicals, serials, and scholarly journals.

As regards ICT infrastructure

At the level of information and communications infrastructure there is a need to;

- Establish a comprehensive network to facilitate access to information and access to international networks.
- Supply special libraries and information centres with more computer terminals and devices such as printers, scanners and CD-ROM towers, etc., to start providing electronic information resources and services.
- Encourage special libraries and information centres to adopt some ICT applications that assist in automating specific operations according to their priorities. This will enable libraries to raise the current level of services and to satisfy their requirements.
- Encourage special libraries and information centres to start designing their own web pages in order to facilitate access to their content, and to make the most of electronic services that could be provided over the internet.

- Speed up the process of establishing digital libraries in order to give special libraries the capability of providing efficient and effective services to users.
- Accelerating the creation of a cooperative action plan between special libraries and information centres for the delivery of high efficiency services.

Findings from the first phase of this research will allow the second stage of corrective measures to be enacted reliably. Special library users were the focal point of the first survey which has highlighted a considerable demand for information resources. The survey has focused on what users really want and desire and what they actually get. In other words, the gap between what users really require and aspire to and what they actually obtain. Research results have revealed that there is a huge gap between supply and demand. It was clearly obvious that special libraries in Libya were not in a position to offer the required level of services due to a range of constraints and barriers.

Special libraries and information centres play a considerable role in supporting scientific research activities and are considered to be central institutions for the evolution of social, economic, and intellectual life. In addition to this, they play a significant role in the transition process to an information society, which is a compulsory move for the third World and not a matter of choice. More attention and dedicated action needs to be taken towards such types of libraries in order to improve the level of their research activities.

Reliance nowadays on conventional technical services in libraries in general, and in special libraries in particular, has proved to be the wrong path. For that reason, a shift to information technology and its applications is essential to allow these institutions to provide reliable services to end users. The issue today is how to accomplish this with less cost and as soon as possible. Special libraries in developing countries have to go through this phase and have to embark on the implementation of developing their ICT infrastructure and drawing up information policies that ensure the exploitation of information resources to the maximum, to increase the national productivity, by utilising information infrastructure. Improving IT education and the research environment will create new business and facilitate industrial research. This in turn will foster related human development and enhance the overall economy.

5.8 Summary

This chapter has presented the findings of the first survey and discussed the results. The findings of the survey has revealed that special libraries in Libya are not well developed. The survey has also shown that the services currently provided by such type of libraries in Libya are weak and that more attention needs to be paid to trends and technologies in order to remain relevant and to improve the services presented to special library users.

Seeing the importance of today's technology and its capability for improving library services, in addition to realising the recommendation of the World Summit on information society regarding exploiting modern ICT, to foster productivity and expansion of research activity, the conclusion of this study is that building a low cost digital library to develop special library services in Libya in line with the current condition will be vital. The point of designing low cost digital library services originates from the actual need of users of having access to information resources that support research work and everyday jobs. This was evident from the findings of the first survey and the lessons learned which have shown the necessity of designing electronic services to meet the changing needs of the users. The following chapter explores the design of a low cost digital library using Greenstone software which is open source software (and therefore free). It enables the design framework as well at each stage of the design of the proposed digital library.

CHAPTER 6: DESIGN FRAMEWORK

This chapter focuses on the design for a proposed low cost digital library for the National Oil Corporation, which is one of the leaders in the energy sector (in fact all local and foreign companies in the oil sector in Libya run their business under the NOC). It discusses the methodology used for designing the proposed digital library, the framework, and the steps implemented to reach the final goal. Designing a digital library usually comprises several stages (Dawson, 2009). These phases are shown in the following flow diagram;

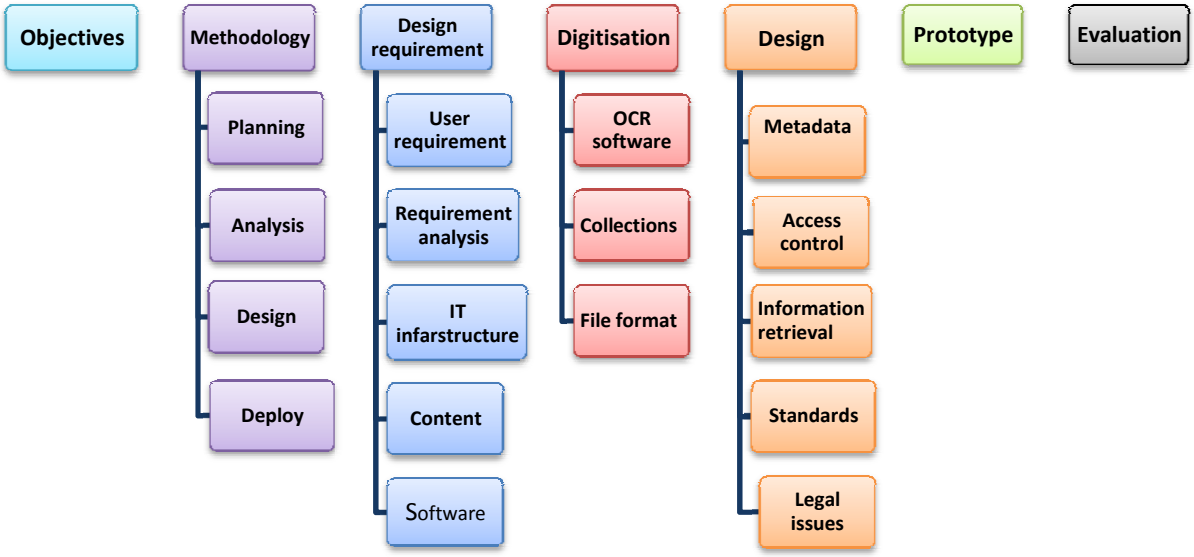


Fig. 6.1: Design flow diagram

6.1 Objectives

The first crucial step is to decide the objectives of designing the digital library. This step has to be considered early – before any further steps are taken. The whole project will be worthless without clear objectives. The objectives of this design are summarised as follows:

- Developing the standard of services presented to end users to enhance the level of research activities within the organisation.
- Using and putting into practice modern ICT to improve the current level of services and to solve the problems that the central library at the National Oil Corporation faces.
- Producing a design for a low cost digital library that provides not only access to and retrieval of information, but also the services that are most frequently required by the users.

6.2 Methodology

"Although there are many methodologies that address a project's lifecycle, the following four phases are generally accepted as standard: Envisioning, Planning, Developing, and Deploying or Stabilising" (IFLA, 2005). From the library's perspective, the scope of the project is not a methodology but rather a definitive statement as to what the digital library is intended to do – what services it will offer to its users and what functions it will perform. The design of a low cost digital library encompass various stages. A system design approach was used for the designing of the proposed digital library. The BNET dictionary defines this approach as "the planning of the procedures to be used in an experimental study" (BNET dictionary). The phases that follow are part of the system design approach. Each phase consists of a number of stages, each stage is subdivided into steps and each step further contains a series of tasks. Thus the total work is broken down into manageable portions.

6.2.1 Planning

The planning stage comprised a survey of the current state of special libraries and information centres in the energy sector. The energy sector was chosen due to its significant role in supporting the Libyan economy which relies mainly on the revenues from the oil sector; these account for almost all of its export earnings and about 25 percent of its GDP. Oil is currently said to be providing the government with its main source of revenue and constitutes 99% of Libya's exports. The National Oil Corporation was chosen for this model from a number of local and foreign oil companies in the country because the NOC is considered the corporation under which all oil enterprises in Libya run their business. In fact all oil has to be sold through NOC which carry out marketing operations of oil and gas, locally and abroad. For this purpose, NOC has its own fully owned companies which carry out exploration, development and production operations, in addition to local and international marketing companies.

The planning phase is considered a fundamental process of understanding why a digital library should be built and determining how it should be built. This process results in a vision document, which outlines the rational for the project, the expected outcoms, the project's feasibility, goals and constraints, opportunities and risks, and the structure of the project. Questions examining economic, technical, and organisational feasibility should be answered at this stage e.g.

- What exactly is the project? Is it possible? Is it feasible? Can it be done?
- If we build a digital library, will it be used?
- Economic feasibility:

Are the benefits greater than the costs? If benefits outweigh costs, then the decision is made to design the library.

- Technical feasibility:

Do we have the technology? If not, can we get it?

What is the current scenario of ICT within the organisation?

The aforementioned questions were answered in this phase to determine the expected value of designing a digital library service. In order to design a digital lirary there is also a need to undertake a feasibility study which is a short assessment of the proposed digital library to determine whether the projected library can effectively meet the specified business requirements of the organisation as well as to identify constrains, budget, time, ICT infrastructure and resources.

The first survey, which comprised of questionnaires and interviews with librarians and managers of information units in a number of oil companies, have focused on the following:

❖ Policy in relation to:

- Computers
- Networks
- Internet: Type and speed
- Intranet

❖ Policy related to content, focusing on:

- Electronic resources
- Budget
- Access control

❖ Policy related to management:

- Familiarity
- Willingness to provide efficient and effective services
- Vision: e.g. vision with regard to developing ICT policy.

- Plans: e.g. any plan for moving towards an electronic library service.

❖ Policy related to training

- User training
- Librarian training
- Cost and type of training programmes

The first survey, which was conducted in July 2007 in order to reveal the state of library services in different sectors as mentioned in chapter three showed that special library services in Libya are poor and not well developed. Therefore, designing low cost digital library services may possibly help in solving some of the problems faced by special libraries, and strengthen the services presented to targeted end users. The survey also revealed that special library users are eager and willing to use electronic library services and the demand for such services is enormous. Because special libraries are supposed to provide services for experts, scientists, and research workers, who always demand specialised services perfectly, faultlessly, and accurately, the design of a low cost digital library could assist in providing these most wanted services that satisfy diverse user needs and requirements. Regarding ICT infrastructure in the energy sector, the survey has revealed that this sector is well equipped with ICT infrastructure. Therefore, designing a low cost digital library is likely to be much easier within the existing ICT infrastructure because the way for such development is already paved. Additionally, the number of computers connected to the Internet in corporations attached to the energy sector is higher than the number of computers in other sectors. So it is hoped that the design of the proposed digital library will be successful and users will benefit more from the services, which will be offered through the digital library.

Computer literacy is also considered a crucial issue. Establishing the feasibility of developing the proposed digital library was the main concern and the priority of this study. The survey explored how end users use computers and the Internet, as both tools are considered the backbone of today's electronic services. In terms of the capability of users to use the proposed digital library the responses indicated that the chance of successfully exploiting extensive information resources through the digital library is quite promising. Firstly, in terms of use of computers, responses showed that half of the users surveyed (50%) had a wide knowledge of computers, and under a fifth (17%) considered themselves as experts in the use

of computers and associated software. Only a tiny percentage (2%) of special library users reported a total lack of knowledge in the use of computers. Secondly, in terms of use of the Internet, responses showed that over half of all users surveyed (56%) had a wide knowledge in the use of the Internet and under a fifth of them (15%) considered themselves as experts in the use of the Internet. Only a small percentage (6%) of special library users reported that they possessed absolutely no knowledge of the use of the Internet. These figures indicate that the proposed digital library should be a great opportunity for special library users and the creation of electronic services should be beneficial to the targeted users as there is no point in having a richly equipped digital library with superb electronic services that no-one can make use of it due to a lack of the required skills amongst the proposed users.

As regards policy related to computers, networks, the Internet, intranets and access controls the survey revealed that oil companies in general, and the NOC in particular, had a written policy. Some oil companies have issued and released specific resolutions to regulate the use of the Internet, intranet, and access control.

Management policy was also investigated relating to the following:

- Familiarity with the technology.
- Willingness to provide efficient and effective services.
- Vision: e.g. visions with regard to developing ICT policy.
- Plans: e.g. any plan for moving towards an electronic library services.

Responses revealed that a number of oil companies, and the NOC in particular, had plans to provide digital library services in the near future. The scientific library of the Arabian Gulf Company for oil exploration has established a new project for the establishment of a technical database. The central library of the National Oil Corporation will have, as soon as possible, a link to the parent organisation's website. Librarians at the central library of the NOC have decided to provide electronic services such as current awareness and SDI services, in addition to online services through this link. It can be said, therefore, that there is a trend among oil companies towards moving to electronic library services. However, libraries in oil companies are still in the early stages of a move towards entirely electronic services.

As regards policy related to user training, librarian training, types of training courses, and the costs of training courses responses showed that just under half of the selected libraries (47%)

had a document regarding the training of human resources and the type and cost of training courses.

6.2.2 Requirements Analysis

Developing services that meet the expectations of users and customers is critical to success. Requirements analysis is the foundation of a user-centred approach, and helps to create projects and services that appeal to and meet user needs (Hertefelt, 2009). User requirements analysis is not about asking users what type of services they want. User requirements analysis is about understanding the current practices and the problems they encounter. This stage is comprised mainly of the analysis of fieldwork, which has been done to allow an availability check of the required components needed in the design of the digital library. Requirement analysis shows what elements and components are necessary for the proposed digital library. This stage should provide answers to questions such as:

- For whom is the digital library going to be designed?
- Who are the key users?
- Administrators – Internal research staff – External researchers – Academics - Other
- How many users are going to benefit from the proposed digital library?
- What is the actual status of the ICT infrastructure in the organisation?
- What type of material is already in digital form?
- What sort of materials need to be digitised?
- What items are distributed within the organisation or the institution?
- What Items or resources are outside the organisation or the institution?

In brief, the requirements analysis should also indicate the need for the following:

❖ Internal documents which include:

- Reports
- Statistics
- Standards

- Technical data
- Publications by people within the organisation

❖ External documents which include;

- Purchased materials (in either hard copy or electronic format)
- Documents obtained from other resources

6.2.3 Analysis

Three semi - structured interviews were conducted to gather information related to ICT infrastructure, currently used IT applications, and information resources and services in the energy sector. The first interview was conducted with manager of information unit in the National Oil Corporation (NOC) and the second interview was conducted with the librarian responsible for running the central library of the NOC. The third interview was conducted with manager of system support in the same organisation. These semi-structured interviews have assist in creating the digital library and getting the aforementioned questions answered.

The intention of these interviews was to identify the most needed and frequently used resources, most common problems, etc. The result of these interviews was a list of the most frequently used resources and common problems. In addition to this, it was possible to recognise how users would prefer to use these resources, and what approach was currently being used for the retrieval of information resources. From this, it was possible to establish the metadata and the requirements needed for designing a digital library in this situation. The interviews conducted also focused on identifying frequently used resources and the format of these resources or documents, whether these resources were in hard copy or in electronic form and if they had specified internal resources which would consist of reports and publications created by employees within the targeted organisation. External resources were also identified and the means used for acquiring these resources were identified. The abovementioned interviews assisted the developer in creating the proposed digital library in an effective way as many questions were answered at this stage for example;

As regards the first and seconed questions, the key users of the proposed digital library were identified as the NOC administrators, employees, internal research staff , external researchers in addition to academics. The number of users who maybe benefit from making use of the services which the library will provide was also dentified as 1000 users at least . As regards the

actual status of the ICT infrastructure in the organisation, it was recognised that ICT was used for a range of office work and other applications in the organisation. These tasks generally included e-mail, word processing, spreadsheets, and database management systems. The central library of the NOC had good hardware facilities including scanners, printers, and CD-ROM towers, etc. The library had computer terminals and devices such as printers and scanners to provide electronic information resources and services.

The central library of the NOC own a considerable number of digital materials. These digital resources can comprise the collections of the peoposed digital library. The digital-born materials are in various file format and cover a wide range of resources and documents on various subjects such as reports, production reports, maps, NOC publications, technical data, statistics, and publications by people within the organisation. There are also considerable numbers of documents which need to be digitised so that users can have easy access to these materials on the digital library. The manager of information unit in the NOC in accordance with the company's copyright regulation asked the developer to restrict and control some materials such as theses and dissertations collection from being accessed on the library by external users without permission. This could be done by allowing only authorised users to view and browse such a collection.

6.2.3 User Studies

User studies are considered to be one of the most important activities in the design of a digital library (Dawson,2009). The first survey focused on special library users and highlighted a considerable demand for information resources. The survey focused on what users really want and what they actually get. Research results have also shown that there is a huge gap between supply and demand. It was obvious that special libraries in Libya were not in a position to offer a good level of services due to the problems they face. Therefore, designing low cost digital library services is expected to improve the services presented to end users and to satisfy, to a large degree, the diverse needs of end user

6.2.4 User Requirements

The first survey was conducted in order to shed light on the status of special libraries and the level of user satisfaction with the offered services. The survey results revealed that users seek out heterogeneous resources. Reliance on homogeneous resources, which comprise one sort of information materials i.e. print materials, proved to be insufficient to satisfy user

requirements by information specialists. Consequently continuing to provide homogeneous resources has affected the services in a negative way. The survey findings also revealed a scarcity of electronic materials. Therefore, it is essential to start providing heterogeneous content that comprise various kinds of materials and information resources. Electronic services constitute a new horizon for special library users that should be rediscovered in order to find out what is new in a world, which expands every day with new innovations. Provision of heterogeneous information resources as well as materials suitable for teaching, learning and research should enrich research activities in many ways and should improve the condition of the current services. Moreover, access to a multi-content digital library should contribute to the development of ongoing research and supply end users with new possibilities. In order to recognise what sort of information resource is most required from a user's viewpoint, the first survey included a question on this particular issue. The responses showed that electronic journals ranked first (95%), followed by electronic books (90%). Official publications and reports were also ranked at the top at 95% and 90% respectively; statistical data was also popular at 90%. Newspapers and patents ranked last at just 40% and 50% respectively with literature reviews at 60% and specifications at 65%. The figures also illustrate other information materials such as literature reviews, standards and specifications whose demand goes up and down according to user preferences. As previously stated, there are various information resources but only some of them were found to be essential and, from the users' perspectives, to be obtainable in electronic form in a digital library.

6.3 Design

Once the requirements analysis is concluded, the next step is to design the proposed digital library. The design phase decides how the system will operate, in terms of hardware, software and available infrastructure. The previous mentioned iterview which was conducted with system support manager in the National Oil Corporation revealed that the ICT infrastructure in the energy sector in general and in the NOC in particular has reached a good level and that this sector is well equipped with ICT infrastructure. Therefore, designing a low cost digital library is likely to be much easier within the existing ICT infrastructure because the way for such development is already paved. The first step in the design phase is to develop the design strategy or the framework. In fact, there are several points that need to be considered before starting the physical design of the proposed digital library. These are as follows;

6.3.1 Library Purpose and Philosophy

The purpose of designing the proposed digital library originates from the actual need of users to have access to information resources that support their research work and everyday jobs. This was evident from the first survey and the lessons learned which have shown that there is great need for designing electronic services to meet user needs and requirements. The proposed digital library should support research activities in different ways. The digital library must be accessible to all research workers and company staff wherever they are regardless of their location. This means that company workforces, either in the main office or in regional branches, should benefit from accessing available resources any time, 24x7. For example, workers in the oil sector need access to seismic technology. Because of the importance of seismic technology, its data needs to be available all the time for research workers in oil fields and engineers working in oil fields who will benefit from accessing the required data through the digital library, so long as they have the basic infrastructure. Since oil fields are already connected to the Internet through Satellite, accessing, browsing, and searching the digital library will not be a problem in this sense. Users who want to have access sensitive materials such as data centre collection (technical library) of the corporation should also have the ability to access any sort of document from anywhere in the country regardless of their location (security settings allowing). The digitisation of the corporation's technical reports and production reports will also be of great importance as it will preserve and safeguard sensitive documents from loss and damage and at the same time will mean they can be accessed in the most convenient way possible.

6.3.2 Software

There are various types of software available for the creation of the proposed digital library. However, because the main principle of this research is to design a low cost digital library, selection from diverse freely available software is a complicated question. Moreover, due to the availability of a variety of open source software that could serve the purpose of the proposed library, selection of appropriate software was a vital issue. Greenstone software was selected due to its good reputation and its support for different languages, which is an essential aspect for the design of bilingual content. In addition Greenstone is capable of displaying the user's interface in multiple languages and handling collections of text, pictures, audio, and video files. The program also offers flexible browsing facilities and can run on Windows and

UNIX. Despite the availability of various open source software programmes required for building digital libraries such as Dspace,(jointly developed by MIT Libraries and Hewlett-Packard Labs), Eprints, Open repository, Open publication system, Fedora, DigiTool, etc., many organisations and institutions worldwide have built their digital libraries using Greenstone software, for example:

- **i Archives**

  The iArchives is several demo collections of digitised newspapers that have been set up by iArchives for clients, including British Library Newspapers, the Californian and the Dublin Evening Telegraph.

- **Most Digital Library (UNESCO)**

  The MOST Digital Library contains results from research carried out during the first ten years of the MOST Programme. The themes covered include drugs, globalisation and governance, International migration, multicultural societies, poverty eradication, and social transformations.

- **Oxford Digital Library**

  A dozen or so collections on an eclectic variety of subjects: ornithology and entomology, prints and maps, educational games from the 18th and 19th century; classic geological literature, medieval science, and many others.

- **National University of Science and Technology**

  A prototype Greenstone digital library for the National University of Science and Technology in Zimbabwe.

However, the most important reason for selecting Greenstone software lies in its capability for building bilingual content, as this feature is not available in any other open source software. None of the previously mentioned software is capable of building Arabic content or displaying the user interface in Arabic. Greenstone software is capable of that because the software is supported by UNESCO, which encourages developing countries to participate in the current information revolution by adopting modern ICT systems. Designing a bilingual digital library that could support both Arabic and English languages was a crucial aspect due to the following:

- English is the second most used language in Libya.
- Most of the literature written in any branch of knowledge can be found in English.

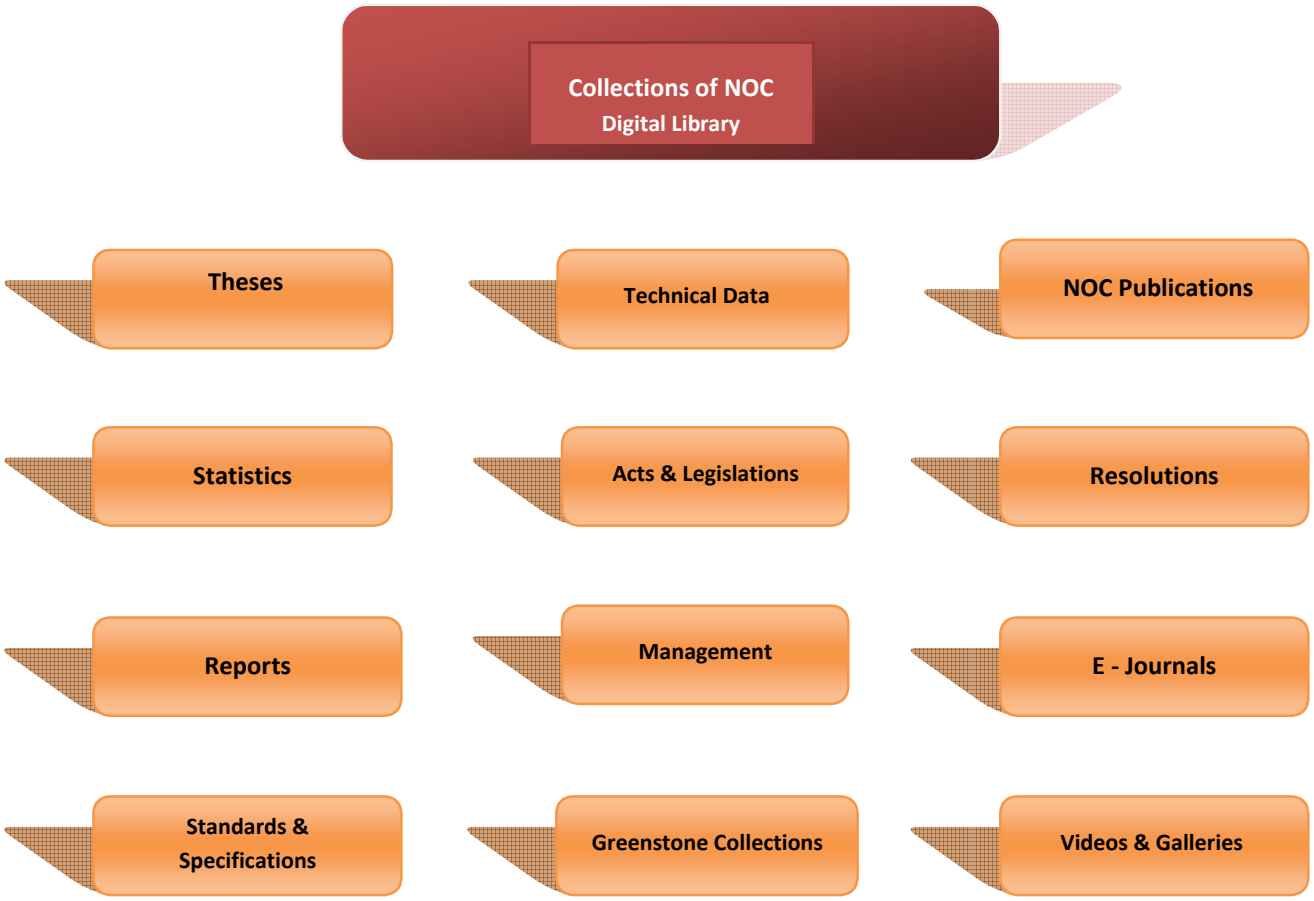
- A considerable number of research workers, especially in the energy sector in local and foreign companies in Libya, are non-Arabic speakers.
- A substantial number of Libyan research workers are acquainted with English.

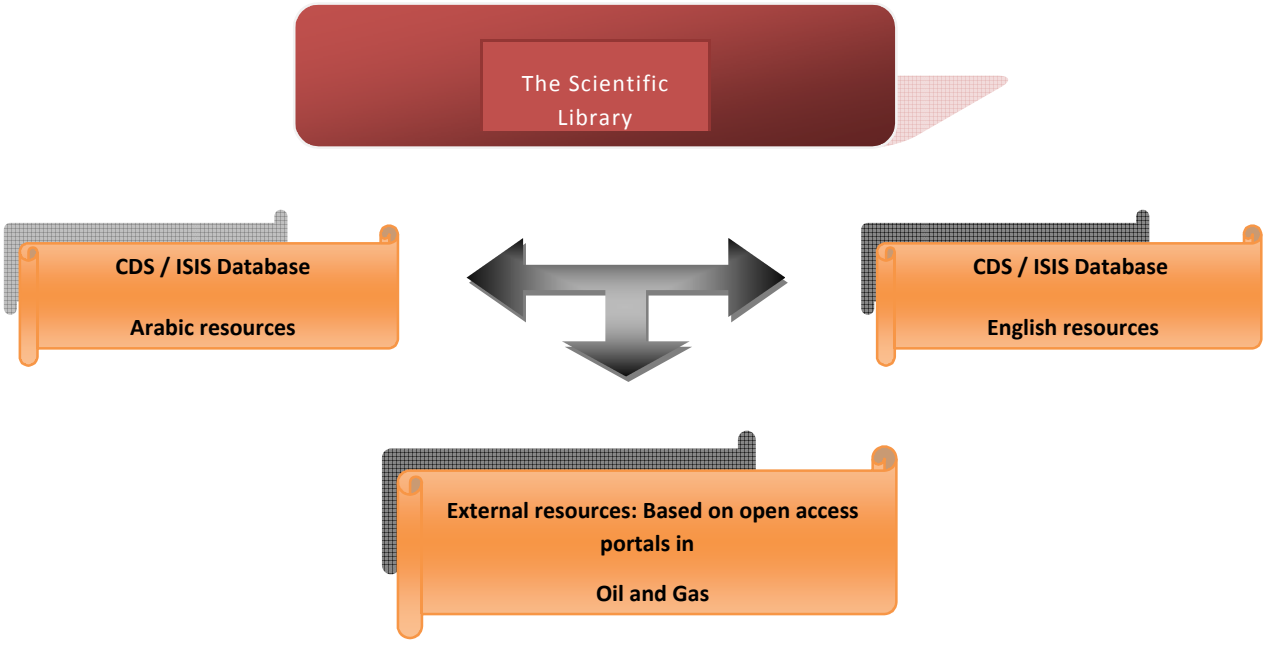
Testing Greenstone

The objective of this test is to ensure that each element of the application meets the functional requirements required for the proposed digital library. The first phase of testing carried out to insure the systems installation and support group, prior to implementing the system. The second phase of testing carried out to prove that all area of the system interface with each other correctly and that there are no gaps in the data flow. The third phase of testing carried out to insure that the system provides acceptable response times for retrieval of information. In this test, some documents were retrieved from the system and the response time proves encouraging. Greenstone has two separate interfaces, the librarian interface and the user interface. Both interfaces were tested to make sure that the system runs as it should be.

6.3.3 Content

As content is considered the key to success for any digital library further attention was given to this issue in order to guarantee the achievement of research goals and the success of the proposed digital library. As there are a number of foreign research workers and employees in the NOC it was decided to create bilingual content in the form of Arabic and English collections. It was also decided to display the user interface in two languages so that users could easily browse and search the constructed library in both languages. This means that the proposed digital library can serve users whose first language is English (native English speakers) and users whose first language is Arabic (native Arabic speakers). By so doing, the proposed library should be highly effective and efficient in providing a variety of electronic services to end users. Initially, the content of the proposed digital library will comprise the following collections:


Collections of NOC
Digital Library
Theses
Technical Data
NOC Publications
Statistics
Acts & Legislations
Resolutions
Reports
Management
E - Journals
Standards & Specifications
Greenstone Collections
Videos & Galleries


The Scientific Library
CDS / ISIS Database
Arabic resources
CDS / ISIS Database
English resources
External resources: Based on open access portals in
Oil and Gas

6.3.4 Content Creation

This step covers the digitisation processes and selections of materials and decisions, in addition to the subsequent manipulation and management processes (Dawson,2003). A variety of decisions have to be made on various aspects before starting the actual design. For example, should optical character recognition (OCR) be applied to create text files and should files be held as images and text. If OCR is found to be technologically and economically feasible the output will have to be checked carefully before dissemination. Choice of formats was another challenge, so it was determined to choose the format according to the nature of original documents. Decisions also have to be made on aspects such as whether to use HTML or rich text to display plain text. For this, it was determined to use HTML for displaying plain text. Other issues related to PDF files such as whether to use PDF or other plug-ins such as the Microsoft word plug-in for displaying documents. A PDF plug-in is important because it is ideal for retaining complex layouts. There are also various formats for image and even more choices. Whilst JPEG is a common format, PNG is spreading quickly, and TIFF can be possibly recommended for printing or preservation. (Dawson,2003).

6.3.5 Digitisation

Before starting the digitisation process, it was crucial to find out the types of available information resources that would make up the collections. Therefore, the interviews conducted with librarians and people at the central library of the NOC focused on this matter. Suggested collections were divided into two groups. The first set comprised those already in electronic form (which were created as digital files) or those converted to digital form (for example scanned documents). The second set comprised traditional documents (printed documents). Suggested documents were also divided into Arabic and English documents.

English Collections

Materials in English may already be in digital form, but in different formats, e.g. PDF, rich text, and MS Word. It is worth mentioning in this context that a decision has to be made before starting to design the digital library whether to display the content of the library in the original format of the document or in HTML format. It is desirable to display the library's content in more than one format to give users the choice of viewing the content in various formats. PDF format is popular for downloading purposes (Dawson, 2003). Traditional print documents, scanned using OCR, are easily displayed in HTML without any problem. However,

the Greenstone system is not capable of retrieving such materials when a search is performed. To overcome this problem all materials converted into PDF using OCR were transformed into searchable PDF using a transformation programme such as ABBYY PDF Transformer 2.0, Adobe PDF professional or Nitro PDF professional. After transformation, Greenstone software was able to retrieve target content when a search was performed. Digitally generated materials (born-digital materials) in PDF format were also converted into searchable PDF format in order to be retrieved. Regarding documents in rich text and Ms Word, no problems were faced in displaying such documents as HTML.

Arabic Collections

Considerable problems were faced in the process of building Arabic collections. In fact, the problem with the Arabic language is related to the poor performance of OCR systems in this domain. Born-digital documents in the Arabic language are easily displayed and retrieved as HTML by the Greenstone system when a search is performed. However documents scanned and converted either to PDF or MS Word can be neither displayed nor retrieved by Greenstone. Moreover, in this case the Greenstone system is not capable of performing a full text search. This means that the Greenstone system is unable to extract words and terms occurring in the text if digitised materials are entered as scanned images. Despite the availability of many specialised OCR programs that claim the capability of converting Arabic from digital image to digital text format, such as Readris 11, none of these programs is capable of dealing with Arabic characters and of converting documents 100 percent. Experience has shown that no programme in this domain is able to give reasonable results as the percentage of success did not exceed 50 percent. Even the retrieval of digital-generated documents in PDF format with this system is difficult when a search is performed, because they are simply not searchable. The Greenstone system cannot recognise and search characters that are not written in ASCII code, which is a standard code used so that data can be moved between computers that use different programmes. It is worth mentioning in this regard that born-digital documents in Arabic can be displayed and retrieved by the Greenstone system provided they are in MS Word, rich text, or searchable PDF. To overcome problems associated with the retrieval of objects in PDF format, documents of such types were carefully reviewed and more attention was given to their associated metadata so that users could exploit enabled browsing facilities instead of search facilities for retrieval purposes. Developers should therefore avoid scanning Arabic

content using OCR systems. Nevertheless, conversion of Arabic content already in digital form from rich text or MS Word to PDF proved to be practical. As regards the format for image, there are also various formats for image and even more choices, as mentioned previously. However, for NOC digital library JPG was used for image.

6.3.6 Information Organisation: Classification and Indexing

In order to make searching more reliable, and allow users to browse across collections, there is a need for controlled methods of information classification. Therefore, the Library of Congress Subject Headings was proposed as a means of linking diverse collections into a coherent information structure, in addition to Arabic subject Headings as a primary means for linking collections in Arabic. The terms of both subject headings needed to be included in the metadata and were used in contexts where international compatibility was required. In order to keep consistency among collections, controlled terminology for place names and organisation names, as well as for technical terms, is necessary where appropriate as authority files, e.g. names of oil fields, names of concessions, and names of areas and locations.

6.3.7 Metadata

Regarding metadata, the question of which metadata standard to use was a key issue. Because of the availability of diverse metadata standards, there was a need to find out which standard could serve the purpose of building the collections of the proposed library. The Dublin core metadata standard was expected to meet the requirements of building the required collections. However, the standard was tested by retrieving some specific files of the content of the digital library. Some metadata elements therefore had to be added to enhance retrieval process and to correspond with the methods of information retrieval by users. Metadata elements were added for example to the collections of technical library (data centre collection) to correspond with the method of information retrieval by users, e.g. concession and location.

6.3.8 Information Retrieval

As web users have become used to the simplest possible search interfaces (Google interface for example) and very fast results, there is no need in the short term to provide complex search facilities for the proposed digital library. Enabling users to search fields such as title, creator, and subject terms, and then to search other metadata fields if no matches are found, then continue with full-text searching or cross-searching only if no matches are found in any metadata fields, was considered sufficient at this stage. It is worth mentioning in this

context that Greenstone software enables users to search collections in different ways. Specifically, the software offers users the capability of doing advanced searches across different collections (cross-collection search) by adding a mixture of collections before performing a search.

6.3.9 Authentication or Access Control

This issue is concerned with policies for controlling access to different types of content; therefore it raises different questions. For example, should all digital content be accessible to all users across the Internet? Is it necessary to control who can access specific collections and make use of it? Should the content of the proposed digital library contain sensitive documents that would affect the company business harmfully if such documents were accessible over the Internet? These issues were discussed and studied before starting the actual design of the digital library. Greenstone software has a built-in access control mechanism which allows collections, and even individual documents, to be restricted to authorised users using a password protection scheme. This mechanism can be applied if the company prefers to apply restrictions to some specific content. A policy for controlling access to different digital content should be written by managers of information units, in companies seeking to build digital libraries, who should take into consideration the negative and positive impact of open access. According to the recommendations of the manager of the information unit in the National Oil Corporation, it was decided to protect some sensitive collections such as the data centre (Technical library) collection, the thesis collection, and e-journals.

6.3.10 Standards

Initially, the core standards applied to the proposed digital library were: Dublin Core and MARC 21 for metadata; Library of Congress subject headings, and Arabic Subject headings for subject vocabulary; AACR2 for resource descriptions; JPG for image. These standards are important for the consistency of resource description across collections and for assisting information retrieval.

6.3.11 User Interface

The user interface is considered an important issue and it is an essential element of the proposed digital library. The design of the prototype had to take into consideration simplicity, consistency and flexibility. The main issue before starting the design of the user interface is to understand the main priorities from the user perspective. Therefore, how the interface should

be designed depends on user opinions and can be decided after conducting some interviews with people in charge and with a number of potential users. Because the user interface can be designed in different ways, it is crucial to understand primary preferences in order to produce a practical design. The second survey and the interviews carried out with librarians, and some potential users from the NOC, shed light on their preferences. This was an essential step before starting the design of the prototype. The most significant issue which was faced within the design stage was in relation to producing a practical design with two different interfaces. On the one hand, it was crucial to design an Arabic and English interface to display collections in Arabic and English. On the other hand, it was also important to build the same collections in a flexible way that could be displayed exactly the same, on any interface. In fact, the Greenstone system has the ability to display multiple interfaces without difficulty. However, producing a practical design that enables users to browse and search collections on different interfaces is not an easy task, as both interfaces should have the same features to display collections effectively and efficiently.

6.3.12 Legal Issues

"Intellectual property and copyright is a considerable issue for nearly all digital libraries therefore it is important to understand the legal issues and to follow legal requirements".(Dawson, 2003). In the short term, legal issues were not considered to be a serious restriction as most of the documents that were to be digitised belong to the National Oil Corporation and most of these documents are internal correspondence, statistical data, reports, and publications by research workers and employees of the National Oil Corporation, in addition to a CDS/ISIS data base which is a bibliographic database in Arabic and English for the holdings of the central library of the NOC. The proposed digital library will also include links to free portals in the oil industries which are not under copyright. In the long term, the NOC has a documented policy regarding copyright issues. This policy supposed to regulates the use of copyright materials as well as intellectual property.

6.4 Prototype

After designing the proposed digital library, the library was tested in order to discover if there were any problems with the design. The prototype was taken back to Libya in order to get feedback on the design and to evaluate the library. The prototype was useful in many

ways: it was built to test the function of the proposed library and to solve unexpected problems. The point of the prototype was to assist in building the full system.

6.5 Evaluation

This is the last stage in designing a digital library. This phase is an important stage as the evaluation will assist in developing the proposed digital library and lead to an improved implementation based on the information collated in the evaluation. The next chapter will discuss the evaluation process and demonstrate the results of the evaluation which will lead to the full design of the NOC digital library. Before moving to the next chapter it is necessary to have an overview of the proposed digital library and its collections.

6.6 An Overview of the National Oil Corporation – Digital Library

This is a snapshot of the NOC digital library which has been designed with the aim of developing the services currently provided for end users. The following screenshot shows the collections of the library. As can be seen, the digital library consists of fifteen different collections. Preferences and help options are located at the upper right corner. Users may set their preferences before starting to browse the library and can consult help options to get more information about how to use the digital library. The digital library home page shows different icons. In order to navigate the library, users have to select a collection by clicking the preferred icon. Once the icon is clicked, the user will be directed to the appropriate collection and a new page will open.

Fig. 6.3: Library interface

The next screenshot shows the thesis collection. This collection is authenticated and requires users to sign in, which means that users have to enter a username and a password in order to view the collection. The NOC digital library contains some other collections that are restricted

to authorised users – especially collections that contain sensitive documents. The collection's name is placed in the upper left corner of the banner. In the upper right corner home, help, and preferences are placed. The home button if clicked will return the user to the home page to select a collection.

Fig. 6.4: Sign in page

The following screenshot shows the CDS/ISIS collection. This is a bibliographic database of the holdings of the central library of the National Oil Corporation. This collection consists of bibliographic details of about 3400 records taken from the NOC CDS/ISIS database. One can browse the publications by title, author, editor, keyword, type of source and location. Advanced searches can be performed using title, creator, keyword, and year of publication, Dewey class, and terms occurring in the text. The search terms can be combined using Boolean operators. By default search is case sensitive, although the preferences can be changed. Browse facilities can be clearly seen under the banner. The user can browse the publications by title, author, editor, keyword, type of information source, and by location of the source in the central library. In fact, the CDS/ISIS database, which is a standalone database, was converted to web interface using the Greenstone facility so that users can search and browse the central library catalogue from anywhere, provided they have Internet access and basic ITC infrastructure.

Fig. 6.5: CDS/ISIS database

The following screenshot displays the advanced search facility. Users can enter a query directly into the space provided and click on “run query” or use “advanced search” which can be performed using title, creator, keyword, year of publication, Dewey class, and terms occurring in the text. The search terms can be combined using Boolean operators. Users have to set their preferences to “advanced search” in order to be able to perform this task as the ordinary search is set by default to plain search. The preferences button also enables users to change the search preferences in regard to query mode, query style, case differences, word ending, and search history.

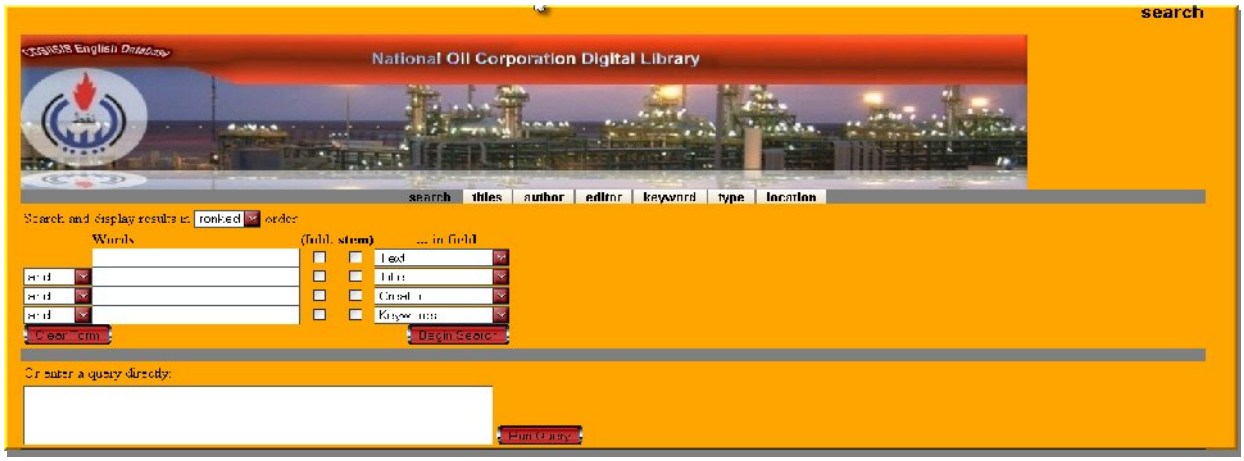


Fig. 6.6: Advanced search facility in NOC digital library

The following screenshot displays titles from the CDS/ISIS collection in browse mode. It can be seen that titles are arranged alphabetically from A – Z and then from 1 – 9. Users can browse the titles under particular letters. Users could also browse the database using author, editor, and keyword in the same way.

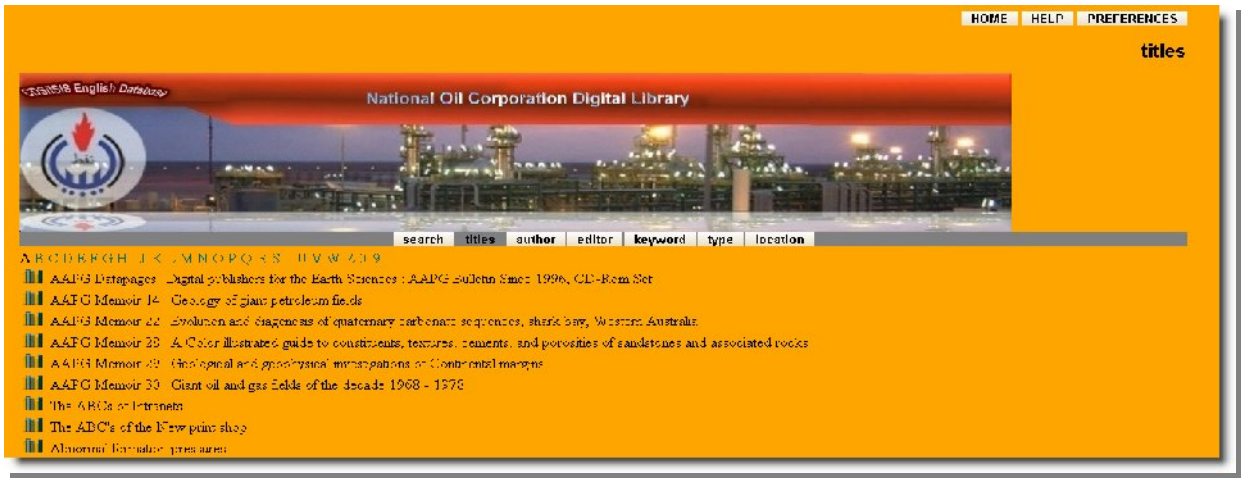


Fig. 6.7: Browse facility

The next screenshot displays the data centre collection. The Libyan concession map is displayed as part of this collection, which includes a number of oil fields and oil concessions in Libya. Users have the ability to open this file as a PDF if a download is required or they can open it as HTML as seen in the screenshot. For this collection, more metadata elements were added such as concession and location to correspond with the method of information retrieval by users.

Fig. 6.8: Data centre collection

The aim of the following screenshot is to explain how users could perform a cross-collection search. This collection contains a number of reports. To perform cross-collection searches within this collection, users should first click the preferences button and then check the collections they want to search. As can be seen on the snapshot there are four sub-collections which can be included if all these collections were checked, the Greenstone system would perform searches in all included collections, and as a result retrieved documents would be from a range of collections. To prevent the system from searching sub-collections, users should uncheck the name of the collection to be excluded.

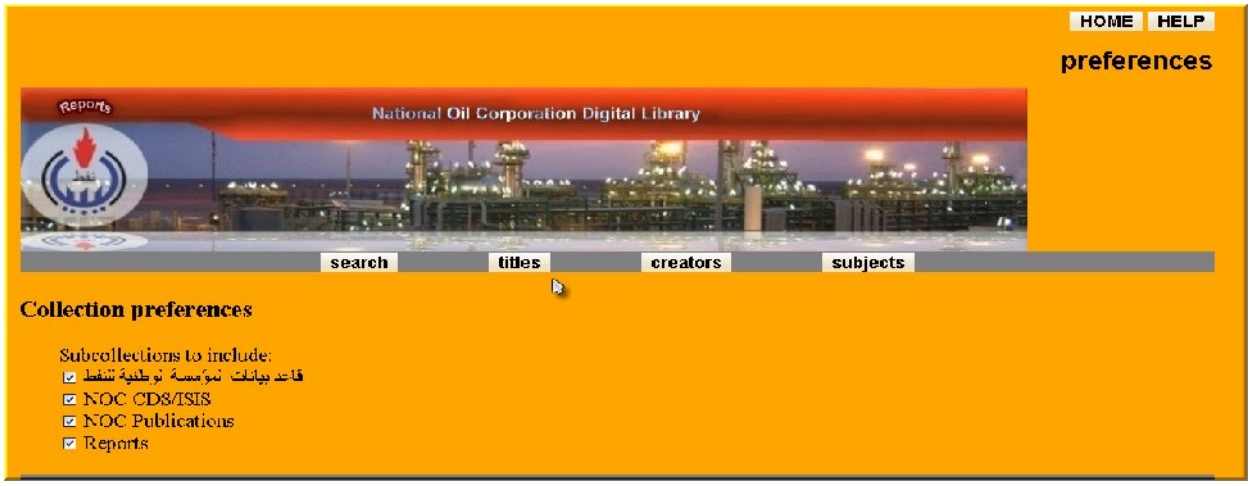


Fig. 6.9: Cross-collection search

This screenshot shows the previous collection on the Arabic interface. The same principles could be applied in regard to cross-collection search.

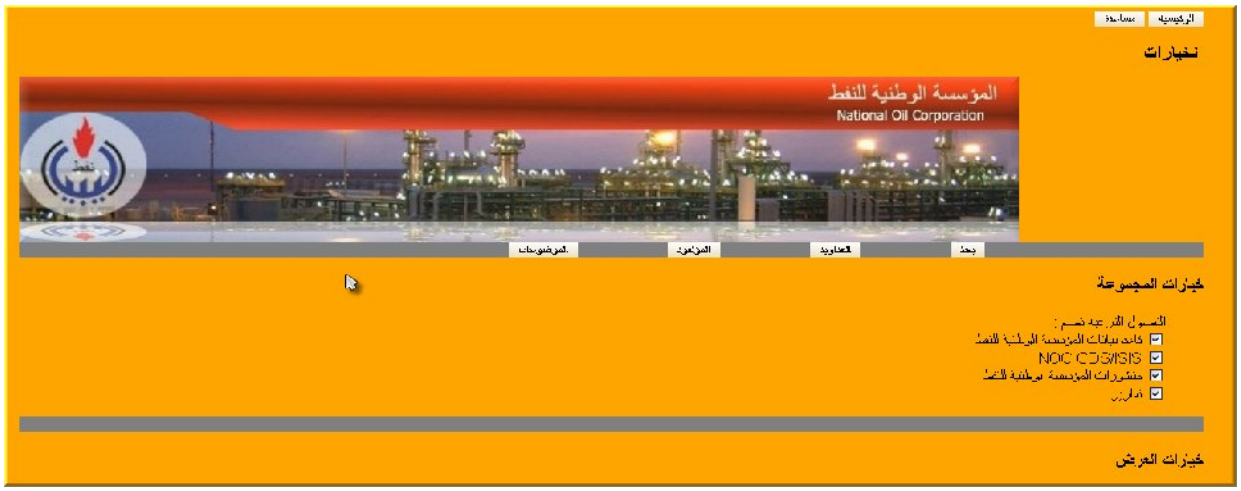


Fig. 6.10: Arabic interface

The Arabic interface in advanced search mode can be seen in the screenshot below. Users should follow the same principles used on the English interface to perform advanced searches on the Arabic interface. Users can enter a query directly into the space provided and click on run query or use advanced search which could be performed using title, creator, keyword, year of publication, Dewey class, and terms occurring in the text. The search terms can be combined using Boolean operators.

Fig. 6.11: Arabic interface in advanced search mode

The following screenshot displays some titles from a collection called standards and specifications. It can be seen that the titles appear first in English and then in Arabic. Displaying the collection in this way can assist users in different ways. Two small icons are placed beside each title. These icons show library users that the object can be displayed in HTML and in PDF.

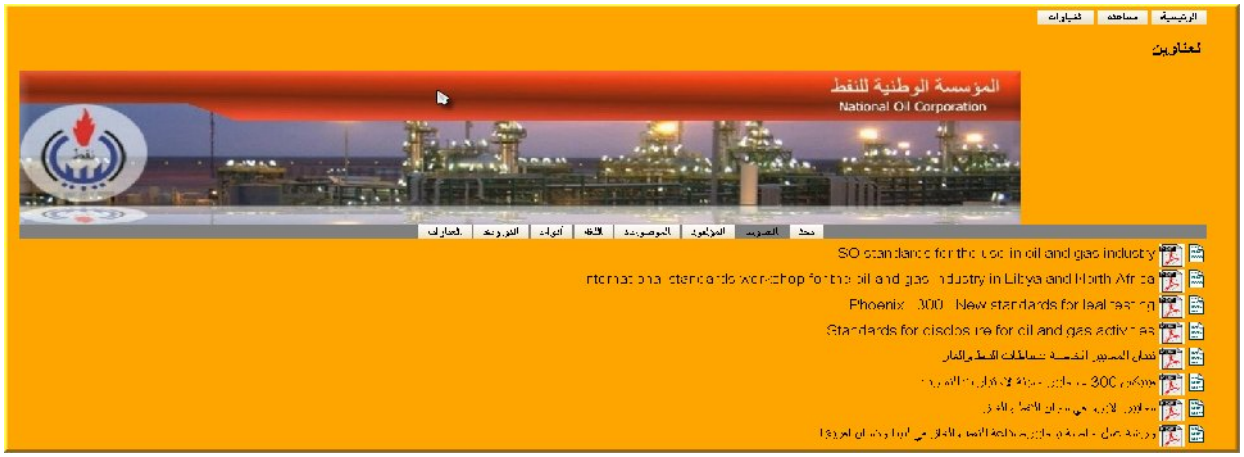


Fig. 6.12: A view standards and specifications collection

The next screenshot displays some photos of the video and gallery collection. JPEG format was used as it is a very common format.

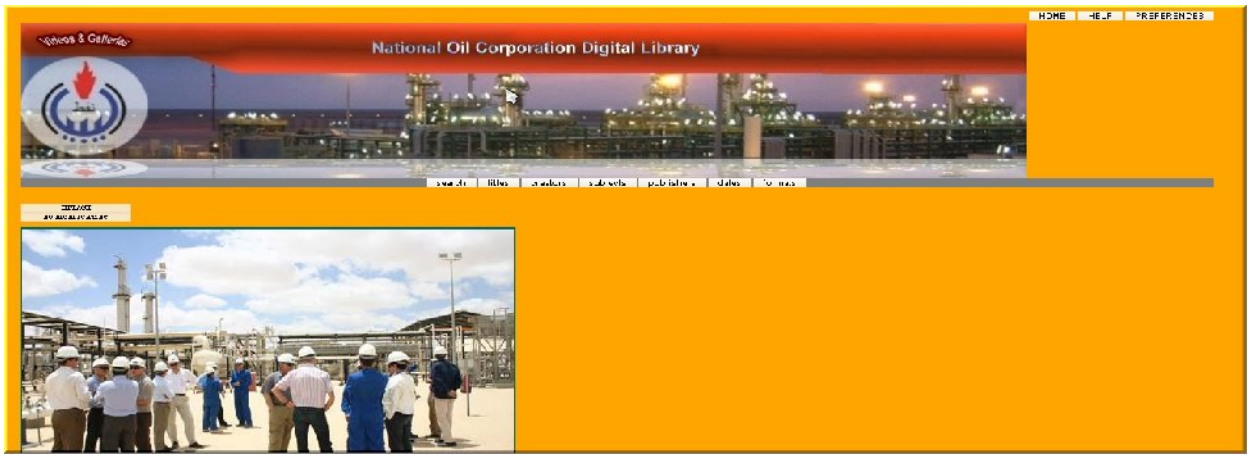


Fig. 6.13: The video and gallery collection

Fig. 6.14: Some photos of the gallery collection

The following screenshot shows the open access resources collection. This collection consists of some free portals in the energy sector. These free portals have been added to the collections of the NOC digital library in order to provide users of the digital library with free open access to resources in the fields of oil and gas. This enables users to search the portals without having to leave the digital library.

Fig. 6.15: Open access resources collection

This screenshot displays the collection of e-journals. The e-journals collection is made up of NOC subscribed electronic journals. Users can login using a username and password. When users make their selection and choose the journal a message appears on the screen warning them that the link they have selected is external to any of their currently selected collections. If they still wish to view this link and their browser has access to the Web, they can go forward to this page; otherwise they use their browser's "back" button to return to the previous document.

Fig. 6.16: E-journals collection

6.6 Summary

In order to overcome the problems facing special libraries in Libya and to improve the services provided to end users, a shift to the application of information technology would seem to be essential to give this type of libraries the capability of providing reliable services to users. This chapter has focused on the design for a proposed low cost digital library for the National Oil Corporation. It highlighted the framework, the stages implemented for building the NOC digital library and the methodology used to achieve this goal. This chapter ended with an overview of the NOC digital library. The screen shots presented at the end of this chapter highlighted the collections of the prototype digital library and explained how users can use the developed library effectively. This chapter has also discussed the problems that were faced in designing the proposed digital library, especially in the digitisation phase and explained how such barriers and constrains were overcome.

The following chapter discuss the evaluation of the prototype digital library. Evaluating the prototype digital library is considered an important stage towards developing a full-scale NOC digital library. In this context, It is important to mention that the evaluation of the NOC digital library will assist the developer in solving the problems related to usability of the library. This in turn, will help in building an useful NOC digital library.

CHAPTER 7:

EVALUATION OF NOC DIGITAL LIBRARY

The previous chapter presented the design for the proposed digital library. This chapter discusses the evaluation of the prototype and reviews the analysis of the questionnaire, which was used for gathering data pertaining to the digital library that was built. User opinions and views on the digital library are presented in this chapter. Evaluating the prototype digital library is considered an important stage towards developing a full-scale NOC digital library. Different approaches have been used by digital library developers depending on their evaluation goals (Solis, 2005). Buchanan (2009) states that usability and usefulness can be readily combined, and that questionnaire and observation are valid multi-method approaches. For the NOC digital library a usability–centred approach was applied to evaluate user perceptions as to the ease of the use of the prototype library and to assess user satisfaction. To achieve the evaluation of the prototype library, the work has been divided into different phases, each stage is subdivided into steps and each step further contains a series of tasks. Thus the total work is broken down into manageable portion.

Objectives

The purpose of this stage is to assist in answering the following questions;

- What are the problems facing library patrons in using the prototype library?
- To what extent was the prototype library efficient in assisting users to get the most from it?
- To what extent was the user interface successful in assisting library users to find and discover relevant resources in the most convenient way?
- To what extent were browsing and searching facilities suitable for end users? Is there any need to modify these facilities to meet user needs and requirements?

7.1 Generic Stages

This stage clarifies the main activities, purposes, and assessment activities. It is divided into the following steps:

- Drawing up an evaluation plan
- Data gathering and recording

- Data analysis and interpretation of results
- Presentation of findings

Drawing up an Evaluation Plan

Before designing the questionnaire a plan has to be established which clarifyies what sort of data should be collected and for what purpose. Saracevic (2004) views digital libraries as complex social, institutional, and technical systems. No evaluation can possibly address all of these aspects together. Thus different approaches have been used by other researchers to achieve different evaluation goals (the desired knowledge about a system, its performance or usability) e.g. a systems-centred approach, a human-centred approach, a sociological approach, an economic approach, and a usability-centred approach. Chowdhury (2006) concludes that "Digital libraries differ significantly from one another in terms of their nature, content, target users, access mechanisms, etc., and consequently it is difficult to measure the usability of such diverse digital libraries through one set of universally accepted tools and benchmarks." Fuhr (2007) states that "digital libraries are complex systems; they can be, and are, viewed from different perspectives. The methods and metrics for the evaluation of (DLs) may vary according to whether they are viewed as institutions, as information systems, as new technologies, as collections, or as new services". The International Standards Organisation (ISO) defines usability "as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." As usability of the constructed digital library is considered to be one of the most important issues and can reflect to great extent the success of the prototype library, the researcher assessed the following elements:

Interface Features

- Search facilities (e.g. simple vs. expert search)
- Attractiveness and consistency.
- Language of the interface.
- Navigation options. Cross collection search, and usefulness of results.
- Visual appearance: use of colours, typography, layout and graphics, font size, and font type.

- Personalisation of the interface, e.g. the ability to define the number of records on one page, sort options, etc.

What Needs to be Discovered Through This Evaluation?

- Ease of use. To evaluate users' perceptions as to the ease of the use of the library.
- Quality of user's experience.
- How satisfied are the users? Satisfaction and success.
- What changes are required?

7.2 Methodology

Evaluation is the systematic process of determing the merit, value and worth of something. Evaluation method is a series of steps or actions taken to accomplish an evaluation. Saracevic (2004) states that "the range of methods used in digital library evaluations is wide. It would be hard to find a scholarly evaluation method that was not used". A number of evaluation studies have involved several methods. Ingrid Hsieh - Yee (2005) identifies the following methods:

- Surveys, including direct questionnaires and online surveys
- Structured interviews
- Focus groups
- Observations
- Task accomplishment
- Think aloud
- Case studies
- Experimentation
- Records analysis
- Usage analysis
- Documents, meeting, communication analysis (anthropology)
- Economic analysis
- Cross- cultural assessment
- Transaction logs analysis

Saracevic (2004) states that digital libraries are complex entities therefore many methods are appropriate. “Each method has, by definition, certain strengths and weaknesses. There is no one best method and there never will be one”. The evaluation method applied for this task consisted of a questionnaire survey for gathering the data for the evaluation of the digital library. Questionnaires were used as the primary method of getting user feedback during the experiments. Check–box questions were used in this questionnaire and a Likert scale was also used to measure usability criteria

Likert Scales

Likert scales present users with a statement and they are asked to register their level of agreement or disagreement with the statement. The intention of using the Likert scale lies in the fact that this type of scale is capable of measuring users tendency. A five-point scale was used instead of a seven-point or a three-point scale in the evaluation of this library. A five-point scale can measure what needs to be discovered and can fulfill the purpose of the evaluation. In fact, the seven-point scale is usually used in psychological studies where phenomena are much complicated and require in depth anaylisis to understand human behaviour. The score of the scale was listed at the base of the scale.

Administering the Scale

In order to capture the perceptions of respondents with respect to the features that they evaluated in the Likert scale, each question required the respondent to rate each feature on a response scale. For instance, they could rate each item on a 1 to 5 response scale where in the first question:

1. = very poor
2. = poor
3. = barely acceptable
4. = good
5. = very good

And in the second question

1. = strongly disagree
2. = disagree
3. = undecided
4. = agree
5. = strongly agree

The questionnaire was made up of three general sections:

- The characteristics that users wanted the new library to have.
- Search tools and preferences.
- Quality of user experience and required changes.

7.3 Participants

A number of questionnaires were distributed to a sample of employees and research workers within the National Oil Corporation in different departments and administrative units. In addition, a number of questionnaires were distributed to managers and systems people in different locations of the same organisation. The mechanism used for selecting a sample of special library users is described below.

According to the labour force statistics for the oil and gas sector issued by the Manpower Planning Department in Libya in September 2007, the number of employees and workers at the National Oil Corporation totalled 908 people. In order to have a manageable sample of special library users, a small sample from the total number of employees was selected (5%) and the questionnaire was then distributed to 40 employees and research workers in the organisation. In addition to that 6 questionnaires were distributed to managers and systems people in the corporation. According to Nielsen (2003), “in this type of surveys on usability, from the fifth user on, most of the usability problems that maybe found in an information system are already identified. From then on, the results present little variability”. A small sample of users was used as it was recognised that the evaluation process would require volunteers to use the prototype digital library for a period of time and that a large sample would involve diverting a considerable amount of resource from sore activities. Questionnaires were distributed by hand to National Oil Corporation employees. The researcher had visited the central library of the NOC for three consecutive days. During these three days volunteers were asked to participate in the evaluation study. In the test, volunteers were requested to freely search the prototype digital library for a period of between 15 and 20 minutes and then to answer the three sets of questions. It was assumed that through this exercise, the participants got a general understanding of this library. From the 46 questionnaires which were distributed to NOC library users, 38 questionnaires were completed representing a response rate of (83%). As this figure is acceptable in research and academic studies, the figure was judged to be reliable and acceptable and gave a good indication regarding the effectiveness of the design of the

prototype digital library. 96% of distributed questionnaires to managers and systems people were returned complete.

7.4 Analysis

Table 7.1: Calculations of responses for the first question

Feature	Very poor	Poor	Barely acceptable	Good	Very good	Rating average	Response count
Arabic interface	1 (2%)	4 (11%)	3 (8%)	19 (50%)	11 (29%)	3.92	38
English interface	2 (4%)	2 (4%)	7 (18%)	17 (48%)	10 (26%)	3.82	38
Navigation options	8 (21%)	4 (11%)	12 (32%)	8 (21%)	6 (15%)	3.00	38
Cross-collection search	7 (18%)	9 (24%)	8 (21%)	10 (26%)	4 (11%)	2.87	38
Simple search	2 (4%)	4 (11%)	6 (16%)	12 (32%)	14 (37%)	3.84	38
Expert search	2 (5%)	2 (5%)	3 (8%)	23 (61%)	8 (21%)	3.87	38
Full text searching	9 (24%)	11 (29%)	3 (8%)	7 (18%)	8 (21%)	2.84	38
Clear and readable text	7 (18%)	13 (35%)	3 (8%)	5 (13%)	10 (26%)	2.95	38
Font size and type	8 (21%)	11 (29%)	6 (16%)	9 (24%)	4 (11%)	2.74	38
Visual appearance	2 (5%)	7 (18%)	3 (8%)	14 (37%)	12 (32%)	3.71	38
Preferences	2 (5%)	4 (11%)	8 (21%)	12 (32%)	12 (32%)	3.66	38
Personalisation of interface	8 (21%)	4 (11%)	2 (5%)	14 (37%)	10 (26%)	3.37	38

Here is how the rating average for the first row in the first question **Arabic interface** was calculated.

1 (1) + 4 (2) + 3 (3) + 19 (4) +11(5) = 149

Sum of selected choices or calculated frequencies:

1 + 4 + 3 + 19 +11 = 38

Sum of frequency times column weight divided by the sum of selected choices:

149/ 38 = 3.92

The rating average is **3.92**

This means that the respondents selected between columns 3 and 4 or between barely acceptable and good, but very closer to good or 4.

Overall grade or indicator for the first question = **3.38**

Table 7.2: Calculations of responses for the second question

Statements	Strongly disagree	Disagree	Tend to agree	Agree	Strongly agree	Rating average	Response count
My experience with the library today was quite pleasurable	3 (8%)	3 (8%)	6 (16%)	12 (31%)	14 (37%)	3.82	38
I was able to navigate easily in the digital library	6 (16%)	8 (21%)	10 (26%)	10 (26%)	4 (11%)	2.95	38
The results I obtained in my searches were relevant	9 (24%)	5 (13%)	7 (18%)	14 (37%)	3 (8%)	2.92	38
The design of the library is clear, simple, and consistent	2 (5%)	2 (5%)	8 (21%)	12 (32%)	14 (37%)	3.89	38
Search and browse facilities are good enough for retrieval of information	2 (5%)	4 (11%)	10 (26%)	12 (32%)	10 (26%)	3.63	38
The library works fine in both languages	7 (18%)	9 (24%)	4 (11%)	8 (21%)	10 (26%)	3.21	38
Personalization of the interface made my experience more enjoyable	7 (18%)	3 (8%)	11 (29%)	9 (24%)	8 (21%)	3.21	38
The digital library offers related links to other electronic resources	6 (16%)	4 (11%)	2 (5%)	12 (31%)	14 (37%)	3.63	38

Here is how the rating average for **the first row** in the second question was calculated.

Sum of frequency times column weight

3x(1) +3x(2) +6x(3) +12x(4) +14x(5) = 145

Sum of selected choices or calculated frequencies

3 + 3 + 6 + 12 + 14 = 38

Sum of frequency times column weight divided by the sum of selected choices

145 / 38 = 3.82

The rating average is **3.82**

This means that the respondents selected between columns 3 and 4 or between barely acceptable and good, but very closer to good or 4.

Overall grade or indicator for the second question is **3.41**

7.5 Discussion

Above and below indicator:

It would be rather difficult to extract any conclusion from these numbers, but it gives a general idea on how to compare those questions that were graded either below or above this number. Below is a list of indicators that have larger deviations from the indicator calculated for the first question

Above the indicator 3.38

- Arabic interface (3.92)
- English interface (3.82)
- Simple search (3.84)
- Expert search (3.87)
- Visual appearance (3.71)

Below the indicator 3.38

- Cross-collection search (2.87)
- Full text searching (2.84)
- Clear and readable text (2.95)
- Font size and font type (2.74)

Below is a list of indicators that have larger deviations from the indicator calculated for the second question.

Above the indicator 3.41

- My experience with the library today was quite pleasurable (3.82)
- The design of the library is clear, simple, and consistent (3.89)
- Search and browse facilities are good enough for retrieval of information (3.63)
- The digital library offers relevant links to other electronic resources (3.63)

Below the indicator 3.41

- I was able to navigate easily in the digital library (2.95)
- The results I obtained in my searches were relevant (2.92)
- The library works fine in both languages (3.21)
- Personalisation of the interface made my experience more enjoyable (3.21)

The first block shows a high performance in the design of the Arabic and English interface in addition to high performance in the design of the visual appearance and search and browse facilities. The features with a poor grade reflect some design problems. The grades given to font size, font type and clear and readable text may reflect some problems that need to be fixed and improved.

In the second question, again, according to the above indicators the first block shows a high performance in terms of general accessibility and user satisfaction but the grade given to relevant search results may also reflect a problem with advanced search facilities especially in the Arabic interface where stemming does not work as it should be as the recall of relevant documents in the set of all documents returned by a search was too low.

7.6 Results

The overall grade returned for the first and second question is quite reasonable as the highest grade was 5. This indicates that a considerable number of the library's characteristics seem to be efficient and effective.

The design of the Arabic and English interfaces was quite good as (50%) and (48%) respectively of returned responses demonstrated that the design was quite good.

Simple and advanced search was also quite reasonable according to user feedback (3.84) and (3.87).

Font size and type of font reflected some design problems and need to be fixed by changing both the type of the font as well as the size.

7.7 Summary

This chapter has discussed the evaluation of the prototype digital library and reviewed the analysis of the questionnaire, which was used for gathering data pertaining to the digital library that was built. User opinions and views on the digital library were presented in this chapter. Evaluating the prototype digital library was an important stage towards developing a full-scale NOC digital library. This chapter has showen that evaluation of digital libraries is an important stage in developing of digital libraries and have to be carried in order to handle any problem appears in the construction phase. This chapter has also discussed the range of methods that can be used in digital library evaluations e.g. surveys, structured interviews, experimentation, focus groups, observations, etc,. The results of the evaluation can assist to large degree in enhancing the constructed lirary as well as users experience in the use of the library and can also assist in avoiding the problems associated withing the developing phase.

The next chapter discuss general guidelines for design of a low cost digital library for special library users in developing countries and the Arabic speaking world. This guideline is part of the outcomes of this thesis and has been published in IFLA 2009 conference in Milan-Itlay.

CHAPTER 8:

GENERAL GUIDELINES FOR DESIGN OF A LOW COST DIGITAL LIBRARY FOR SPECIAL LIBRARY USERS IN DEVELOPING COUNTRIES AND THE ARABIC SPEAKING WORLD

8.1 Introduction

The world is witnessing a considerable transformation from print based-formats to electronic-based formats thanks to advanced computing technology, which has had a profound impact on the dissemination of nearly all previous formats of publications into digital formats on computer networks. Text, still and moving images, sound tracks, music, and almost all known formats can be stored and retrieved on computer magnetic disk (Ashoor, 2000). Over the last two decades, a number of special libraries and information centres in the Arab world have introduced electronic resources into their library services. Very few have implemented automated and integrated systems. Despite the importance of designing digital libraries, not only for accessing or retrieving information, but also for the provision of electronic resources and services, a handful of special libraries in the Arab region have begun to design digital library services. Managers of special libraries and information centres in developing countries in general and in the Arab world in particular should begin building their local digital libraries, as the benefit of establishing such electronic services is considerable and known to expand research activities and deliver services that are most wanted and most frequently required by target end-users. Building low cost digital libraries is becoming uncomplicated thanks to the availability of open sources software, which is required for building such services. Nowadays, various software, such as Greenstone, Dspace, and Eprint, is freely available. The Greenstone software was produced to build New Zealand's digital library, and afterwards became available to assist particular libraries in developing countries to build their local digital libraries in order to enhance the services presented to target end-users and to provide adequate and appropriate information resources. The software provides a new way of organising information and making it available over the Internet or on CD-ROM. The following section will discuss briefly how to build a low cost digital library using freely available open sources software, and what sort of services could be provided through the proposed digital library.

8. 2 Digital Libraries

There is no doubt that there are many different views in the literature as to the actual nature of digital libraries. This paper does not intend to provide a comprehensive collection of definitions of the digital library, but rather a number of representative definitions. A variety of terms are still used interchangeably worldwide, such as electronic library, hybrid library, library without walls, cyber library, virtual library etc. Arms (2000) views digital libraries as “managed collection of information with associated services, where the information is stored in digital formats and accessible over a network”. Witten (2003) defines the digital library as a focused collection of digital objects, including text, video, and audio along with methods for access and retrieval, and for selection, organisation and maintenance of the collection. The Digital Library Federation (DLF) defines digital libraries as “organisations that provide the resources, including the specialised staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities." According to Jeng (2006) digital library in the 21st century has the following characteristics:

- It is an organised and managed collection of digital objects
- It is accessible over the internet or a server
- It is a global information infrastructure and;
- It should offer services.

The last point indicates that there is a difference between a digital collection and a digital library in that a digital library should offer service to end users. Therefore, a digital library is considered a collection of information objects and a collection of services that should be provided by the digital library. “The definition of a digital library that came up in March 1994 in the Digital Library Workshop emphasised that a full service digital library must accomplish all the essential services of traditional libraries and also exploit the well-known advantages of digital storage, searching, and communication” (Chowdhury,2002).

Leiner (2009) reports that “There are a large and varied set of services, including services to support the management of collections, services to provide replicated and reliable storage,

services to aid in query formulation and execution, services to assist in name resolution and location, etc."

At the initial meeting of the WG (held January 7-8, 1998 at Stanford University), the following definition was proposed by Leiner (2009) "A digital library is

- The collection of services
- And the collection of information objects
- That support users in dealing with information objects
- And the organisation and presentation of those objects
- Available directly or indirectly
- Via electronic/digital means.

8.3 Phases of Building Low Cost Digital Library Services

The first step in designing a low cost digital library for any special library or information centre is the planning of the new system. However, before the planning stage, the objectives and goals of the project should be considered.

Objectives

The first crucial step is to decide the objectives of designing the digital library. This step has to be considered early – before any further steps are taken. The whole project will be worthless without clear objectives. The objectives of the design could be, for example:

- Developing the standard of services presented to targeted end users to enhance the level of research activities within the organisation.
- Producing the design of a low cost digital library providing not only access to and retrieval of information, but rather services that are most wanted and frequently required by end-users.
- Using and putting into practise modern ICTs to improve the standard of services provided to end-users and to deliver services that are most required and aspired by special library' users.

8.4 Methodology

An experimental and system design approach should be used for the design of the proposed digital library. The BNET dictionary defines this approach as "the planning of the procedures to be used in an experimental study" (BNET dictionary). This approach should be applied due to its suitability for such types of projects, as it has been proven by various studies that this approach is the most appropriate method for creating digital libraries. The phases that follow are part of

the system design approach. Each phase consists of a number of stages, each stage is subdivided into steps and each step further contains a series of tasks. Thus the total work is broken down into manageable portion.

8.4.1 Planning

This is the fundamental process of understanding why a digital library should be built and determining how the developer will go about building it. Questions examining economic, technical, and organisational feasibility i.e.

- What exactly is the project? Is it possible? Is it practicable? Can it be done?
- If we build a digital library, will it be used?
- Economic feasibility - are the benefits greater than the costs? If benefits outweigh costs, then the decision is made to design the library.
- Technical feasibility - do we have the technology? If not, can we get it?

The aforementioned questions should be answered in this phase to determine the expected value of designing a digital library service. A feasibility study is a short assessment of the proposed digital library to determine whether the projected library can effectively meet the specified business requirements of the organisation as well as to identify constrains, budget, time, ICT infrastructure, and resources.

8.4.2 Survey and Fieldwork

A survey has to be conducted to gather general information and basic data on the current state of the targeted organisation or institution to which the library belongs. The survey has to focus on the real status of the following:

- ICT infrastructure within the organisation. To focus on the number of computer, e.g. how computers are distributed in the organisation, how many for library use and how many for general use.
- Type of internet connection
- Policy related to:
    - Computers
    - Networks
    - Internet

- Intranet

❖ Policy related to content : To focus on

- Electronic resources
- Budget
- Access control

❖ Policy related to management:

- Familiarity
- Willingness
- Vision: e.g. visions with regard to developing ICT policy.
- Plans: e.g. any plan for moving towards an electronic library services.

❖ Policy related to training

- Librarians training
- Users training
- Cost of training courses
- Type of training courses

8.4.3 Requirements Analysis

Developing services that meet the expectations of users and customers is critical to success. “Requirement analysis is the foundation of a user-centred approach, creating projects and services that appeal and meet user needs” (Hertefelt,2005). User requirements analysis is not about asking users what type of services they want. User requirements analysis is about understanding users' current practices and the problems they encounter. This stage is comprised mainly of the analysis of fieldwork, which has been done to allow an availability check of the required components needed in the design of the digital library. Requirement analysis shows what elements and components are necessary for the proposed digital library. This stage should provide answers to questions such as:

- For whom is the digital library going to be designed?
- How many users are going to benefit from the proposed digital library?

- What is the real status of the ICT infrastructure in the organisation?
- What are the current practices and problems users encounter?
- What type of material is already in digital form?
- What sort of material is to be digitised?
- What Items are distributed within the organisation or the institution?
- What Items or resources are outside the organisation or the institution?

In order to answer the questions above, fieldwork is required for this phase. Observations and on-site visits are significant tools for this stage. Interviews should also be conducted during this phase to gather information pertaining to information resources and services in the targeted organisation. The interviews have to be conducted to identify most required and frequently used resources, as well as to gather information on tools and techniques currently used, problems and so forth. The output will be a list of most frequently used resources and services in addition to recognise how users would prefer to use these resources in order to decide the metadata and the requirements for designing the digital library. Identifying frequently used resources and their format, i.e. hard copy or electronic form, should be the focus of the interviews. Internal resources, which consist of reports and publications created by employees within targeted organisations should also be specified to assist in building the digital library in the most effective way. In brief, the requirements analysis should also indicate the following:

- Internal documents which include:
    - Reports
    - Statistical data
    - Publications by individuals within the organisation
- External documents:
    - Purchased materials, whether in
        - Hard copy
        - Electronic format
- Documents obtained from other resources

8.4.4 User Studies

User studies are considered to be one of the most important pillars required for designing digital libraries. The aforementioned survey should highlight the extent of demand for electronic resources. The survey should focus on what users really want and what is actually provided for them. In other words, the gap between what users really need and aspire to and what they actually obtain. The results will show whether there is a gap between supply and demand. If the finding of the survey clearly indicates a gap between supply and demand, then designing a low-cost digital library is anticipated to bridge this gap and to improve the services presented to end-users to a greater degree, as well as to meet users' diverse needs and requirements.

8.4.5 User Requirements

The aforementioned survey should shed light on the current status of the special library and the level of users' satisfactions. As is well-known, reliance on homogeneous resources, which comprise only one sort of information material, i.e. printed material, has proved by information specialists to be inefficient in satisfying user needs and requirements. Consequently, continuing of provision of homogeneous resources will affect the services provided in a negative way. Findings of the survey should also reveal the volume of electronic materials vis-à-vis traditional resources. Electronic services constitute a new horizon for special library users that should be rediscovered in order to find out what is new in a world that expands every day with new innovations. Providing heterogeneous information resources as well as materials suitable for teaching, learning and research should enrich research activities in many ways and should improve the status of the current services. Moreover, access to a multi-content digital library will contribute to the development of ongoing research and supply targeted end-users with new experiences.

8.5 Design Challenges

The followings challenges maybe faced when designing a digital library:

- Interoperability issues: different formats, media, hardware and software.
- Scalability: problems associated with expand of collections and the growth of the library.
- Sustainability: problems associated with developing and maintaining the constructed library.

8.6 Design

Having concluded the requirements analysis, the developer of the digital library can then start the design. The design phase decides how the system will operate in terms of hardware, software and available infrastructure. The first step in the design phase is to develop the design strategy and examine the suitability of the chosen software**.** It is also important at this stage to decide types of content and the collections, which will comprise a significant part of the digital library. Special collections – printed and/or digital – that are of importance to users in the organisation should be designated at this stage. Knowing the content of the proposed digital library is essential in order to be able to decide on the metadata, as well as on the language of the content. The content of the proposed digital library may be in a single language or it could be in several languages. However, this depends on the purpose of the proposed digital library and the policy of the institution or the organisation to which the library belongs.

8.6.1 Software

Various software is freely available for creating the proposed digital library. However, as the basic principle of the design depends mainly on the creation of an inexpensive digital library, selection of appropriate software from various freely available open sources software is therefore a complex question. This step is very important in order to reduce the cost of the design and to keep it to a minimum. What is more, due to the availability of a variety of open source software, such as Dspace, Greenstone and many others, that can serve the purpose of designing the proposed library, selection of appropriate software for building the digital library appears to be complicated issue and must be considered carefully before choosing the software. If Arabic is the language of the content of the proposed digital library or if Arabic is its second language, then Greenstone software would seem to be most appropriate. This software is one of the leading open source software due to its good reputation and support of different languages, which is an essential aspect required for the design of bilingual content. Producing a design for a bilingual digital library that supports both the Arabic and English languages is a crucial aspect. However, it should be taken into consideration that:

- English is the second language in many Arabic countries.
- Almost all literature written in any branch of knowledge is published in English.

- A substantial number of scientists and research workers in almost all Arabic countries are acquainted with the English language.

Greenstone is regarded as one of the leading software in this domain, as mentioned previously, and can deal with documents in different languages. In addition, the software is capable of displaying the user interface in multiple languages and handling collections of text, pictures, audio, and video. The software also offers flexible browsing facilities and can run on Windows and UNIX. Dspace software would also be a very good choice. However, fairly good knowledge of dealing with open source software is required to modify Dspace to support the Arabic language. Despite the availability of various open source software required for building digital libraries such as Dspace; Bepress; Eprints; Open repository ; Open publication system; Fedora, and so forth, many organisations and institutions worldwide have built their digital libraries using Greenstone software. Among these are the Indian Institute of Science Publications database; the Indian institute for management; the Sudanese Association of Libraries and Information;-Sudan Open Archive.

In fact, the most important reason for choosing Greenstone software is its ability in building the content in two languages. This feature is not available in other open source software. No other software mentioned above is capable of building Arabic content or displaying a user interface in the Arabic language. Greenstone software is capable of building and displaying Arabic content because the software is supported by the UNESCO, which encourages developing countries to participate in the current information revolution by adopting modern IT applications.

8.6.2 Content

As content is considered to be the key to success for any digital library, further attention should be given to this issue in order to guarantee the achievement of design goals and the success of the created digital library. If the aim of the constructed library was to serve research workers with different background and languages, then creation of bilingual content would possibly be the right decision. In this case, the display of users' interface in multiple languages is essential so that users can browse and search the constructed library in both languages with ease. By so doing, the constructed library would be effective and efficient in providing a variety of electronic services to targeted end-users. The content of the digital library may vary according to the specialisation of the organisation and the area of interest of targeted end users. However, the following collections could be part of any special library or information centre:

statistics; standards and specifications; publications of the organisation; reports; patents; technical reports; dissertations and theses; e-journals; videos and galleries; and bibliographical data.

Library catalogue

The standalone CDS/ISIS database could be converted into a web interface enabling users to browse and search the library catalogue from anywhere, with open access resources and links to free portals in the field of interest.

8.6.3 Content Creation

This step covers the digitisation processes and prerequisite selections and decisions, in addition to the subsequent manipulation and management processes. (Dawson, 2003). A variety of decisions must be made on various aspects before starting the actual design. For example, whether OCR should be carried out on text files held as image or text. If OCR as image is found to be feasible it must thereafter be carefully checked before dissemination. Choice of formats is another challenge - which file format should be used to display the content of the library. Decisions also have to be made on other aspects, such as whether to use XHTML or rich text to display plain text. Another issue is related to PDF files, that is, whether to use PDF or another plug-in such as Ms Word plug-in for displaying documents. PDF plug-in is ideal for retaining complex layouts. “There are also various formats for image and even more choices. Whilst JPEG is common format, PNG is spreading widely, and TIFF is possibly recommended for printing or preservation” (Dawson, 2003). These issues will be discussed in the digitisation stage.

8.6.4 Digitisation

Before starting the digitisation process, it is crucial to find out what types of collection are to be digitised, and available resources that will be part of the collections and comprise a great deal of their content. Suggested collections have to be divided into two groups. The first set comprises those already in electronic form (digital-born) or converted to digital form. The second set comprises traditional documents (printed). Suggested materials should also be separated into different sets according to their language.

English Collections

Materials in English may already be in digital form, but in different formats, e.g. PDF, rich text, and Ms Word. It is worth mentioning in this context that a decision has to be made before

starting to design the digital library whether to display the content of the library in the original format of the document or in HTML format. It is desirable to display the library's content in more than one format to give users the choice of viewing the content in various formats. PDF format is popular for downloading purposes. Traditional print documents, scanned using Optical Character Recognition (OCR), would be easily displayed in HTML without any problem. However, the Greenstone system is not capable of retrieving such materials when a search is performed. To overcome this problem all materials converted into PDF using OCR would have to be transformed into searchable PDF using a transformation program such as ABBYY PDF Transformer 2.0, Adobe PDF professional or Nitro PDF professional. After transformation, Greenstone software would be able to retrieve target content when a search was performed. Born-digital materials in PDF format should also be converted into searchable PDF format in order to be retrieved. Regarding documents in rich text and Ms Word, no problems would be faced in displaying such documents as HTML.

Arabic Collections

Considerable problems could be faced in the process of building Arabic collections. In fact, the problem with the Arabic language in this respect is due to the weakness of the Optical Character Recognition system in this domain. Born-digital documents in the Arabic language are easily displayed and retrieved as HTML by the Greenstone system when a search is performed. Documents scanned and converted either to PDF or Ms Word can be neither displayed nor retrieved by Greenstone. Moreover, in this case the Greenstone system is not capable of performing a full text searching. This means that the Greenstone system is unable to extract words and terms occurring in the text if digitised materials are entered as scanned images. Despite the availability of many specialised OCR programmes that claim the capability of converting Arabic from digital image to digital text format such as Readris 11, none of these programmes is capable of dealing with Arabic characters and of converting documents 100 percent. Experience has shown that no programme in this domain is able to give reasonable results. Even the retrieval of digital-born documents in PDF format by the system is difficult when a search is performed because they are simply not searchable. The Greenstone system cannot recognise and search characters that are not written in ASCII code, which is a standard code used so that data can be moved between computers that use different programmes. It is worth mentioning in this regard that born- digital documents in Arabic can be displayed and

retrieved by the Greenstone system provided they are in Ms Word, rich text, or searchable PDF. To overcome problems associated with the retrieval of objects in PDF format, documents of such types should be especially reviewed and more attention should be given to their associated metadata so that users could exploit enabled browsing facilities instead of search facilities for retrieval purposes. Developers should therefore avoid scanning Arabic content using the Optical Character Recognition system. Nevertheless, conversion of Arabic content already in digital form from rich text or Ms Word to PDF has proven to be practical. As regards the format for image, there are also various formats for image and even more choices, as mentioned previously.

8.6.5 Information Organisation: Classification and Indexing

In order to make searching more reliable and allow users to browse across collections there is a need for a controlled method of information classification. Therefore, Library of Congress subject headings could be used as means of linking diverse collections into a coherent information structure, in addition to Arabic subject headings as a primary means for linking collections in the Arabic language. The terms of both subject headings could be included in the metadata and used in contexts where international compatibility is required. In order to keep consistency among collections, controlled vocabulary for place names and organisation names, as well as for technical terms, should be used where appropriate as authority files e.g. names of persons, names of concessions, and names of areas.

8.6.6 Metadata

Regarding metadata, the question of which metadata standard to use and implement is a key issue. Because of the availability of diverse metadata standards, there is a need to find out which standard could best serve the purpose of building the collections of the proposed library. The Dublin Core metadata standard is expected to meet the requirements of building the required collections. However, the standard should be tested and some field elements may be added to correspond with the methods of information retrieval by target end-users and to make the retrieval process more efficient and effective.

8.6.7 Authentication or Access Control

This issue is concerned with policies for controlling access to different types of content and therefore it raises various questions. For example, should all digital content be accessible for the public over the internet? Is it necessary to control who can access specific collection and

make use of it? Should the content of the proposed digital library contain sensitive documents that would harm a company's business if such documents were accessible over the internet? In fact, such issues have to be discussed and studied before starting the actual design of the digital library. Greenstone software has a built-in access control mechanism that allows collections and even individual documents to be restricted to authorised users using a password protection scheme. This mechanism can be applied if the organisation prefers to apply restrictions on access to some specific content. A policy for controlling access to different digital content should be written by managers of information units in companies or organisations seeking to build digital libraries and should take into consideration the negative and positive impacts of open access.

8.6.8 Standards

The core standards that should be applied to the proposed digital library are Dublin Core and MARC 21 for metadata, Library of Congress subject headings and Arabic Subject headings for subject vocabulary, and AACR2 for resource descriptions. These standards are important for the consistency of resource description across collections and for assisting the process of information retrieval.

8.6.9 User Interface

As user interface is considered an important issue and comprises an essential part of the proposed digital library the design of the prototype has to take into consideration simplicity, consistency and flexibility. The main issue before starting the design of the user interface is to understand the main priorities from the users' perspective. Therefore, how the interface should be designed would depend on users' opinions and could be decided after conducting interviews with people in charge and with a number of potential users. Because user interface can be designed in different ways, it is crucial to understand users' primary preferences in order to produce a practical design. The Greenstone system has the ability to display multiple interfaces without difficulty. However, producing a practical design that enables users to browse and search collections on different interfaces is not an easy task, as both interfaces should have the same features to display collections effectively and efficiently.

8.7 Prototype

After designing the proposed digital library, the library should be evaluated in order to discover any problems within the design. The prototype is useful in many ways. In fact, it is usually built to test the function of the constructed library and to solve unexpected problems. The objective of the prototype is to assist in building the full design.

8.8 Evaluation

This is the last stage in designing the digital library. This phase is considered to be an important stage as the evaluation will assist in developing the constructed digital library and lead to the full design.

CHAPTER 9: CONCLUSION

This concluding chapter summarises the main findings of this thesis, reviewing the original research questions of this research before restating the contributions of this work and the implications of the findings.

9. 1 Overview

This thesis has investigated a wide range of issues relating to special library services in Libya in the period covered by this research. The thesis has focused on a variety of issues relating to components that are required for the special library to enable libraries of this type to provide effective and efficient services such as staffing, funding, technical procedures and so on. A wide range of services that are provided by special libraries in Libya have also been examined along with user viewpoints and opinions on the services delivered. The second phase of this thesis has included the design of low cost digital library to suit user needs and requirements. The digital library that was built was aimed not only at providing access to and retrieval of information but also to illustrate that well structured services depend on the latest technology that is capable of making the provision of electronic services a reality.

9. 2 Review of Research Questions

In order to complete the full picture of special libraries in Libya, this research has aimed at answering the following questions:

- What are the major problems facing special libraries in Libya in providing efficient and effective services to end users?
- What are the services and resources most frequently required by special library users and what problems face them in terms of getting the required resources?
- What are the obstacles facing special libraries in Libya which hinder their improvement?
- What is the status of special libraries in Libya with respect to ICT infrastructure, user services, and management policies?
- What ICT infrastructure is available in Libya at the present time for building an appropriate digital library and providing electronic library services?
- What is the gap between the current and required infrastructure and how can that be filled?
- How can IT be used to improve information services for special library users?

- What kinds of services are provided to users and what is the quality of the services presented?

In terms of the problems faced by special libraries and information centres in providing efficient and effective services to end users, this research has revealed that special libraries in Libya are still not in a position to provide a good level of end user services due to many constraints and barriers. Most of the obstacles and hindrances that face special libraries in Libya were found to be related to funding, inadequate allocation of financial support, lack of skilled staff, lack of information strategies and policies, and absence of policies which regulates the use and the implementation of digital and electronic resources in almost all special libraries. This thesis has also revealed that special library services in Libya did not lag behind from their counterparts in the Arab world as the latter face also a variety of problems and constraints which prevent them from providing efficient services to end users. However, the level of use of today's technology particularly in the Gulf region was found to be much better in terms of providing electronic services and implementing integrated systems. Regarding electronic services, this study has shown that a small number of special libraries in Libya have started the provision of such services but the overall picture is not quite as promising as electronic services are still not well developed due to budget constraints and financial allocation which is often not sufficient to purchase and acquire electronic resources or to equip libraries with IT necessary for providing electronic services. Although electronic services are being provided by libraries regardless of their nature and their users because it proved to be cost-effective, still special libraries in Libya struggle to provide electronic services in order to lift their services to the desired level. Regarding the current status of ICT infrastructure, this study has shown that the majority of special libraries in Libya had basic hardware facilities like, computers, printers, etc. The libraries attached to oil corporations and companies had more hardware facilities including scanners, CD-ROM Tower, etc. Moreover, the number of computers connected to the internet in libraries attached to energy sector was found to be higher than the number of computers in other sectors. A high proportion (90 percent) of the selected libraries reported the need to have more computer terminals and devices like printers and scanners to provide electronic information resources and services. Concerning ICT infrastructure in the country in general, great strides have been made on the level of use of the internet as well as on the level of general communications. In this particular, Libya is witnessing considerable changes and improvements. In terms of internet use, usage statistics have shown that the number of internet users in Libya

is on the increase. In terms of broad-band communications, landline calls over the country have become free of charge. Internet users in Libya could also browse and search the internet through mobile devices. This service has been introduced through Libyana and Almadar networks last year. Today internet users can utilise their mobile handsets as a modem when connecting to their PC or laptop. The speed of the internet through this connection is not high (~200 KB per second) but is still reasonable especially in this early stage. In addition to this, there are also other ways to get internet connection. Libya Max is a new Internet service which has been introduced early this year. It is a new broadband wireless internet connection. The speed of Libya Max Internet connection is very high (4 Mb/Sec) in comparison with other available Internet connections in Libya. Libyana Mobile Phone Network has also launched its new wireless broadband with speeds of up to (3.6 Mb/Sec) at the beginning of September 2009. Users can choose one of the packages from the Libyana Net product (Personal or Business) according to the prices that are suitable for them. As regards the question "how can IT be used to improve information services for special library users?" this research has demonstrated the capability of IT in assisting the improvement of the services presented to users through the design of digital libraries. Producing a design for low cost digital library services that are most frequently required by users is considered to be one of the most significant outcomes of this research.

As regards the question "what is the gap between the current and required infrastructure and how can that be filled?" this thesis has revealed that the existing gap needs to be filled in order to strengthen the services currently provided. Governments around the world are focusing on strategies to increase access to and improve the quality of telecommunications. The government has a pivotal role to play in this particular. It should take more targeted policy actions aimed at improving existing ICT infrastructure. It is a critical role of government to provide a common and consistent infrastructure to support a wide variety of government, private sector and community activities. Managers of enterprise, corporate, and government libraries in Libya should also take targeted policy action aimed at improving IT in order to move their libraries towards the electronic environment.

As part of this research, this thesis has identified the problems within current services and highlighted the strength and weaknesses of the services presented to special library users in Libya. This research has also assessev the existing ICT infrastructure and what needs to be done with respect to ICT to achieve the overall goals. This research has also shown that there is a

lack of documented strategies and polices regarding ICT infrastructure, provision of electronic services, and adoption of third generation – technologies. This thesis has also clarified the current level of special library services in Libya by providing us with a fuller picture of the services presented to end users. Existing research and previous studies on special libraries in Libya have failed to examine the actual level of special library services or to develop practical solutions for current problems. Most research undertaken in this domain has focused on one sector while other sectors were neglected or excluded for whatever reason. Consequently, a full picture of special libraries in Libya was not available. This research has completed the picture of special libraries in Libya to a large degree by undertaking a survey of the current state of a sample set of special libraries in various sectors in Libya. This in its turn will assist in solving the obstacles and the hindrances, which these libraries are facing in providing the expected services. As mentioned earlier, applying IT applications in special libraries and introducing electronic services by designing appropriate digital libraries and creating institutional repositories should develop research activities in organisations and institutions in developing countries. This research has shown that application of IT impacts the level of services provided to end users positively. This thesis has also reviewed the impact of IT on special library services. It highlighted the influence of electronic services and integrated systems on special library services and how special libraries could exploit today's technology application to achieve their ultimate goals. This thesis has evaluated the current condition of special libraries and information centres in Libya and has improved our understanding of the extent to which these institutions have been successful in adopting and using information and communication technologies in comparison with special libraries in the Arab world. This study attempted to find practical solutions for developing information services by designing low cost digital library services to suit special library users in Libya and to enhance the current services. Therefore, the main objective of this thesis incorporated the exploration of a novel way for enhancing the services provided to special library users by exploiting and adopting of modern technology. As this research originates from a belief that the current scenario of special libraries in Libya is poor and that a low cost digital library should be designed to meet user needs and requirements, the final goal of this research was achieved by producing a low cost digital library capable of meeting the needs of special library users in Libya and to suiting their requirements.

9. 3 Contributions of This Thesis

As part of this research, contributions have been made in the following ways:

1. Developing a new policy that positions information technology applications, and especially open source software (OSS), as part of a strategic plan for enhancing special library services. Many libraries especially in developing countries are suffering from being unable to deliver the required services to their users due to various barriers and obstacles as stated in this thesis before. Drawing a policy that positions open source software as part of a strategic plan for improving special library services is expected to assist in solving many problems, such as scarcity of electronic resources and absence of access to up-to-date information resources in addition to meeting the needs and requirements of the users.

Open source software (OSS), in conjunction with open access (OA) can also be beneficial to libraries in the long run. For instance, open source and open standards can help libraries provide patrons with easier access to OA materials and other resources, as open standards make it possible to create interoperable systems to access the literature in various OA journals seamlessly.

2. The adoption and exploitation of today's technology in a time of shrinking budgets has become more important than ever. This thesis proposes a new strategy for developing special library services by adopting and utilising open source software since building repositories and digital libraries by using freely available software can assist to a large degree in enhancing the level of the services provided to users.

Corporate, government, and special libraries everywhere are in a continuous state of being closed because the library's operational costs are perceived as outweighing the value provided. Shortage of finances can affect information units and special libraries in a negative way and hinder them from managing their work and providing specialised services in an efficient manner. Adopting and using freely available software for designing digital libraries and introducing electronic service at low cost should assist in fostering the services provided by the special library and satisfying the changing needs of the users.

3. An institutional repository and digital library is a new concept for collecting, managing, disseminating, and preserving research works created in digital form by researchers in individual organisations and institutions. These tools can assist in narrowing the digital divide or the digital gap (through knowledge sharing) between the third world countries and

developed countries which continues to widen between the have and have-nots, or the information rich and the information poor. This in its turn can have positive impact as an instrument for sustainable economic development.

The digital divide is a global phenomenon. A widening digital divide can only widen social divisions and tensions. The problem of relation between the access to and the availability of ICT and the participation in the development of the information society is widely recognised. Access to ICT can have long-lasting benefits for quality of life as individuals can use ICT to develop personal interests, further education, receive job training and so on. Therefore, governments should take more targeted policy actions aimed at bridging the digital divide. The concept of basic infrastructure supported by government is well established. In all nations, the major road and telecommunications networks, basic health and education facilities, and other major facilities have been funded by governments. It is a critical role of government to provide a common and consistent infrastructure to support a wide variety of government, private sector and community activities. Electronic library services are not created overnight. Basic ICT infrastructure has become a necessity for establishing institutional repositories and digital libraries and for delivering electronic services which can assist in narrowing the digital divide through knowledge sharing. These tools can have positive impacts as an instrument for sustainable economic development in any country. Setting up the necessary networked infrastructure and providing the requisite hardware and software in a time of global change has become more important than ever to overcome the digital divide.

4. The promotion of open source content management systems CMS in a non-English environment, e.g. the Arabic language, will help to endorse international and inter-cultural understanding and awareness, provide resources to researchers, expand non-English and non-Western content on the Internet, and contribute to scholarly research.

Data can be defined in a CMS, as almost anything - documents, movies, pictures, audio, video, scientific data, etc. The CMSs are used for storing, controlling, and publishing documentation. Open CMS can assist developing countries in many ways. For example, there is relatively high demand for African content from a large western audience, and it seems to be a good idea for Africans to increase the levels of their content production to meet demand. This will support international and inter-cultural understanding. A greater and far more ambitious is to foster the ability of people in developing countries to build information collections of their own. Then, those with access to the web could create and distribute their own libraries. The problem is

that Africans have not yet recognise their active participation or at least presence on the Internet as an opportunity. Recent studies have shown that non-English and non-Western content on the Internet still dominate the content of the Internet. Therefore, there is a need to promote the adoption of open CMS systems in non-English environment to enrich the Internet with vast and divers content, remove access barriers, accelerate research and assist in creating better environment for inter-cultural understanding and awareness.

5. The promotion of Budapest open access initiative by encouraging decision-makers to make their collections available online so that users can have easy access to vast and diverse resources. The Budapest open access initiative has affirmed that "open access has so far been limited to small portions of the journal literature. But even in these limited collections, many different initiatives have shown that open access is economically feasible, that it gives readers extraordinary power to find and make use of relevant literature, and that it gives authors and their works vast and measurable new visibility, readership, and impact. To secure these benefits for all, we call on all interested institutions and individuals to help open up access to the rest of this literature and remove the barriers, especially the price barriers, that stand in the way. The more who join the effort to advance this cause, the sooner we will all enjoy the benefits of open access". This thesis attempted to promote the aforementioned initiative by encouraging decision makers in developing world in general and in the Arabic speaking world in particular to make their collections available online so that users can have access to vast and diverse resources.

9. 4 Summary

This thesis has investigated a number of key issues affecting the special library in Libya and its services such as staffing, funding, and technical procedures. The role of special library services and its influence on the achievements of an organisation's overall goals has been explored along with the problems facing special libraries in Libya which hinder their improvement. This thesis has put today's technology into practice and has exploited the latest advanced technology in this domain for developing special library services by designing a low cost digital library service as a practical solution. The outcomes have proven encouraging as the design has been shown to be cost effective. The design has also demonstrated that the digital library developed in this thesis can assist to a large degree in developing the services provided to special library users in Libya. This thesis has also shown that digital libraries ought not to be seen as an end in themselves, but rather as a means for enabling end users to access a variety and wide range of frequently required services.

Additional research may be needed to capture deeper and more meaningful manifestations of ICT infrastructures in Libya and IT applications in special libraries such as integrated systems, gateways, portals, repositories.

My hope is that this work contributes to the scholarly work and makes a difference to college and university educators, special librarians and policy makers in Libya.

REFERENCES

Adams, J. Khan, H. and White, D., 2007. *Research methods for graduate business and social science students*. London: Sage.

Akeroyd, J., 1999. Integrated library management systems: overview. *Journal of Information Science*, 29(2), pp. 3-10.

Aladwani, A., 2003. Key internet characteristics and e-commerce issues in Arab countries. *Information Technology & People*, 16(3), pp. 9-20.

Ali, S., 2004. *Special libraries in Libya*. Benghazi: University of Garyounis Publications.

Almasned, M., 2003. Information services of King Faisel information centre for research and islamic studies. *New Library Trends*, 2(4), pp. 82-106.

Alremhy, A., 2003. Special libraries and information centres in Bahrain. *Arab Journal of – Informatics*, 10(8), pp. 15-32.

Alsafy, H., 1996. *Directory of special libraries*. Tripoli: National Centre for Scientific Research.

Amar, H., 2000. *Pharmaceutical information services in Egypt: a study of reality and planning for the future.* Ph.D. Cairo: University of Cairo.

Anon, W., 1958. Needs for special libraries. *UNESCO Bulletin*, 12(3), pp. 254-263.

Anstall, R., 1966. *Special libraries and information bureaux*. London: Clive Bingley.

Arabi, F., 2002. *Libya today.* [online] Available at: <http://www.arab.net/libya/index.html> [Accessed 22 October 2008].

Arms, W., 2000. *Digital libraries*. Cambridge: MIT Press.

Ashcroft, L. and Colin, L., 1999. Electronic journals and university library collection. *Collection Building*, 18(3), pp. 105-112.

Ashoor, S., 2000. Planning the electronic library: suggested guidelines for the Arabian Gulf region. *The Electronic Library*, 1(2), pp. 29-39.

Ashworth, W., 1967. *Handbook of special librarianship and information work*. London: Aslib.

Askhita, H., 2000. The internet in Syria. *Online Information Review*, 24(2), pp. 144-149.

Australian Library and Information Assocaition**.** *Guidelines for Australian special libraries.* [online] Available at: <http://www.alia.org.au/> [Accessed 10 November 2008].

Aziz, Y., 2000. *National information systems*. Benghazi: University of Garyounis Publications.

Babbie, R., 2005. *The basics of social research*. Belmont: Thomson Wadsworth.

Bainbridge, D. McKay, D. and Witten, I., 2006. *Greenstone tutorial execersises.*[online] Available at: <http://www.greenstone.org/exercises\all_tutorials.html> [Accessed 20 January 2009].

Ball, R., 2000. Future trends in special library services. *INSPEL*, 34(4), pp. 133-140.

Biddle, K. and Locke, K., 2007. *Composing qualitative research*. London: Sage.

Bills, L., 2000. Technical services and integrated library systems. *Library Hi Tech*, 2(18), pp. 144-150.

BNET dictionary. *Definition of digital libraries , portals and gateways* [online] Available at: <http://dictionary.bnet.com/> [Accessed 20 January 2009].

Brace, I., 2004. *Questionnaire design: how to plan, structure and write survey material for effective market research*. London: Kogan Page.

Buchanan, S., 2006. *Systems development*. Glasgow: University of Strathclyde .

Buchanan, S. and Salako, A., 2009. Evaluating the usability and usefulness of a digital library. *Library Review*, 58(9), pp. 638-651.

Caputi, P. and Balnaves, M., 2001. *Introduction to quantitative research methods: an investigation approach*. London: Sage.

Cargille, K., 1999. Electronic journals and users. *Serial Review*, 3(25), pp. 23-28.

Catalogue of Internet Resources. [online] Available at : <http://link.bubl.ac.uk> [Accessed 29 August 09].

Cavaye, M., 1996. Case study research: a multi-faceted research approach for Information Science. *Information System Journal,* 6(2), pp. 237-242.

Central Intelligence Agency. The World fact book. *Libyan economy-overview*. [Online] Available at: <https://www.cia.gov/library/publications/the-world-factbook/geos/ly.html> [Accessed 22 October 2007].

Chowdhury, G., 2000. Access to Information in digital libraries: users and digital divide. *Journal of Information Science*, 5(26), pp. 124-130.

Chowdhury, G., 2002. Digital libraries and reference services: present and future. *Journal of Documentation*, 3(58), pp. 33-39.

Chowdhury, G., 2004. Digital divide: how can digital libraries bridge the gap. *Journal of Information Science,* 4(12), pp. 56-63.

Chowdhury, S. Landoni, M. and Gibb, F., 2006. Usability and impact of digital libraries: a review. *Online Information Review*, 30(6), pp. 656-680.

Collier, A., 2002. Arabisation of library and information systems. *Program*, 4(28), pp. 19-24.

Colton, D. and Covert, W., 2007. *Designing and constructing instruments for social research and evaluation*. San Francisco: Wiley and Sons.

Cony, D. and Kenneth, F., 2007. *Conduct structured interviews: students guide.* [online] Available at: <http://www.unu.edu/Unupressr/ UIN04E/uin04e06.htm> [Accessed 22 March 2007].

Czaja, R. and Blair, J., 1996. *Designing surveys: a guide to decisions and procedures*. London: Pine Forge Press.

Daveri, F., 2001. Information technology in Europe. *ACM Computing*, 21(3), pp. 34-38.

David, S. and Claire, A., 1998. *Libraries in the workplace.* Loughborough: Library and Information Statistics Unit.

Dawson, A., 2007. *Building a digital library in 80 days: the Glasgow experience.* [online] available at: <http://cdlr.strath.ac.uk/pubs/dawsona/301.htm> [Accessed 24 January 2009].

Dawson, C., 2002. *Practical research methods: a user-friendly guide to mastering research.* Trowbridge: Cromwell Press.

Dennis, A. and Wixom, B., 2000. *Systems analysis and design: an applied approach.* New York: John Wiley & Sons.

Denscombe, M., 2003. *The good research guide for small-scale social research projects.* London: Open University Press.

Derrick, J. Vijay, G. and Kenneth, K., 2003. Information technology and economic performance: a critical review of the empirical evidence. *ACM Computing*, 35(1), pp. 24-31.

Dias, E., 1989. Special libraries and information centres in Brazil. *International Library Review*, 21(5), pp. 325-335.

Digital library federation (DLF). 2008. *Definition of digital libraries.*[online] Available at: <http://www.diglib.org/about/dldefinition.htm> [Accessed 21 January 2009].

Dillman, D. Tortora, D. and Bowker, D., 1999. *Principles for constructing web surveys.* Thousand Oaks: Sage.

Drake, M. et al., 2005. Encyclopedia of Library and Information Science. London: Taylor & Francis.

Ebenezer, C., 2002. Trends in integrated ibrary systems. *Library Trends*, 4(32), pp. 129-135.

Elaiess, R., 2009. General guidelines for designing bilingual low cost digital library services suitable for special library users in developing countries and the Arabic speaking world. In: Proceedings of the world library *and information congress: 75th IFLA general conference.*Milan, Italy 23-27 August 2009. [Online] Available at: <http://www.ifla.org/files/hq/papers/ifla75/175-elaiess-en.pdf> [Accessed 28 October 2009].

El-Hawat, A., 2006. Human development in Libya. *SDI Africa Newsletter*, 7(3), pp. 21-30.

Eric, F. et al., 2007. Encyclopedia Britannica; ultimate refenrence. *Libyan economy and financial system*. Chicago: Castle Press.

Farajpahlou, H., 1999. Defining some criteria for the success of automated library systems. *Library Review*, 4(48), pp. 169-180.

Festinger, D. and Marczyk, G., 2005. *Essential of research design and methodology*. New Jersey: John Wiley & Sons.

Fink, A., 2003. *How to manage, analyze, and interpret survey data*. London: Sage.

Fink, A., 2003. *The survey handbook.* London: Sage.

Flick, U., 2007. *Designing qualitative research*. London: Sage.

Foard, N. and Henn, M., 2006. *A short introduction to social research*. London: Sage.

Fuhr, N. et al., 2007. *Evaluation of digital libraries*. London: Springer.

Garcia, J., 1997. Specialised libraries and their role in the economic and social context of Latin America. *INSPEL*, 3(4), pp. 133-148.

Geoffrey, C. and Plous, S., 2008. *Research randomizer*. [online] Available at: <http://www.randomizer.org> [Accessed 10 January 2008].

Given, L. et al., 2008. Encyclopaedia of qualitative research methods. London: Sage.

Gray, D., 2004. *Doing research in the real world*. London: Sage.

Haddouti, H. 2005. *Digital Library Initiatives.* [online] available at: <http://www.unesco.org> [Accessed 18 January 2009].

Hakim, C., 1994. *Research design: strategies and choices in the design of social research*. London: TJ Press.

Hasan, H., 2003. *Medical universities libraries and medical institutes in Tripoli: a descriptive analysis study with a proposal to develop*. MSc. Tripoli: University of Alfateh.

Helle, V. and Novo, N., 2006. The impact of e-resources on document supply in a corporate pharmaceutical: the experience of Novo Nordisk. *Interlending & Document Supply*, 3(34), pp. 105-108.

Howitt, D. and Cramer, D., 2004. *The Sage dictionary of statistics*. London: Sage.

Indian Institute for Management. [online] Available at: < http://www.iimk.ac.in> [Accessed 21 September 2007].

Indian Institute for Science Publications. [online] Available at: <http://vidvyan-sbsn-umapak.nuscsi.iisc.eirnet.in/cgi-bin/library> [Accessed 28 September 2008].

Ingrid, S., 2003. Libraries a voyage of discovery. In: Proceedings of annual meeting of IFLA general conference. 14-18 October 2005. New York: United Nations.

Ingrid, Y., 2005. Digital library evaluation: progress and next steps. In: Proceedings of annual meeting of the American Society for Information Science and Technology. 24-27 May 2005.Charlotte, N.C.

International Standards Organisation (ISO), 1982. *Information transfer*.[online] Available at: <http://www.iso.org/iso/home.htm> [Accessed 27 July 2008].

International Standards Organisation (ISO), 1998. *Definitions of usability.* [online] Available at: <http://www.iso.org/iso/home.htm.> [Accessed 13 October 2008].

Internet World Stats, 2008. *World Internet Usage Statistics*. [online] Available at: <http://www.internetworldstats.com> [Accessed 07 June 2009].

INTUTE. Social Sciences Portal [Online] Available at:< http://www.intute.ac.uk/socialsciences/> [Accessed 19 September 2008].

Jason, D. Vijay, G. and Kenneth, K., 2003. Information technology and economic performance: a critical review of the impirical evidence. *ACM Computing*, 35(1), pp. 23-42.

Jeng, H., 2006. *Usability of the digital library: an evaluation module*. Ph.D. New Jersey: State University of New Jersey.

Joanne, M. and Robert ,P., 2003. Competencies for special librarians. *The Electronic Library*, 2(21), pp. 23-29.

Jonker, J. and Pennink, B., 2010. *The essence of research methodology: a concise guide for Master and PhD students.* Heidelberg. Springer.

Judd, M. and Smith, E., 1991. *Research methods in social relations.* New Jersey: Rinehart and Winston.

Jupp, V., 2006. *The Sage dictionary of social research methods*. Gateshead: Athenaeum Press.

Kalof, L. and Dietz, T., 2008. *Essentials of social research.* London: Open University Press.

Kandligy, A., 2000. The use of computers in the field of information services. *Arab Journal of Informatics,* 15(1), pp. 55-83.

Kavle. S., 2007. *Doing interviews: the Sage qualitative research*. London: Sage.

Kebede, G., 2002. The changing of information needs for users in electronic information environment. *The Elctroonic Library,* 1(20), pp. 14-22.

Khurshid, Z., 2003. A survey of the Arabian Gulf library automation marketplace. *Electronic Library and Information Systems*, 37(4), pp. 56-61.

Kothari, C., 2004. *Research methodology: methods and techniques*. New Delhi: New Age International.

Krzanowski, W., 2007. *Statistical principles and techniques in scientific and social science investigations*. New York: Oxford University Press.

Labyed, S., 2007.*Technology level in Libya*.[Onlin]Available at: <http://Ltt.ly/english/index.php> [Accessed 26 October 2007].

Laila, M . and Sajjad, R., 2003. Information operations in the Kuwaiti corporate sector: an analysis. *Electronic Library and Information Systems*, 37(1), pp. 31-37.

Larsen, G., 1992. Library automation in European Community countries: an overview. *Program*, 4(26), pp. 361-371.

Lavrakas, P. et al., 2008. Encyclopedia of survey research methods. London: Sage.

Law, D., 2007. *Beyond the hybrid library: libraries in a web 2.0 world*. London: Springer.

Leiner, M. and Richard, S., 2006. *A working definition of digital library.* [online] Avaialble at: <http://www.diglib.org/about/dldefinition.htm> [Accessed 16 January 2009].

Leiner, M. and Richard, S., 2004. *The scope of the digital library nowadays*. [online] available at: <http://www.dlib.org/metrics/ papers/dig-lib-scope.html> [Accessed 19 January 2009].

Lewis, J. and Ritchie, J., 2003. *Qualitative research practice: a guide for social science students and researchers*. New Delhi: Sage.

Mabrok, A., 2004. *Sectorial information and documentation cantre for housing and utilities: evaluation study.* MSc. Benghazi: University of Garyounis.

Maila, M. and Shayan, M., 2008. Evaluation criteria for digital library software. *INL CDS ware Evaluation,* 3(4), pp. 51-59

Malkawi, M., 2005. *Digital library* services in special libraries. [online] Available at: <http://www.unesco.org/webworld/public_domain/> [Accessed 18 January 2009].

Mann, T., 2005. *The Oxford guide to library research*. New York: Oxford University Press.

Matthews, R., 2002. *The bottom line: determining and communicating the value of the special library*. Westport: Greenwood Publishing Group.

Merriam Webster Online. Available at: <www.merriamwebster.com/dictionary/experimental> [Accessed 24 August 2008].

Meyyappan, N. and Chowdhury, G., 2000. A review of twenty digital libraries. *Journal of Information Science,* 5(26), pp. 24-35.

Mills, A. et al., 2010. Encyclopedia of case study research. London: Sage.

Mohammed, A., 2004. *Legal libraries and legal information centres in Egypt: analytical study*. MSc. Cairo: University of Cairo.

Moyo, L., 2004. Electronic libraries and the emergence of new service paradigms. *The Electronic Library*, 3(22), pp. 13-29.

Naser edden, O., 2003. *Special libraries and information centres in corporate companies in Tripoli*. MSc. Tripoli: University of Alfateh.

Nielsen, J., 1993. *Usability engineering*. San Diego: Morgan Kaufmann.

Olan, M., 2003.Information technology in developing and third world. *Consortium of Computing Sciences in Colleges*, 3(5), pp. 41-45.

O'Leary, Z., 2004. *The essential guide to doing research*. London: Sage.

Otike, J., 1990. The work of a special library: the experience of the library of the kenya national museum. *International Library Review*, 22(11), pp. 191-200.

Patton, Q., 2002. *Qualitative research and evaluation methods.* Newbury Park: Sage.

Ramzan, M., 2004. Levels of information technology applications in muslim world libraries. *The Electronic Library,* 22(3), pp. 274-280.

Rathje, B. and Pollitt, C., 2005. Designing and building integrated digital library systems. *IFLA Journal*, 31(2), pp. 143-163.

Registry of Open Access Repositories (ROAR). *Eprints and other* repositories *publications.* [online] Available at: <http://roar.eprints.org/?action=home&q> [Accessed 15 January 2009].

Richard, B., 2001. Creating digital libraries: an experiment with Green Stone digital library open source software. *D-Lib Magazine*, 10(11), pp. 23-33.

Ridley, F., 1925. Special libraries and information bureaux: their devlopment and future in Britain. *Library Association Record*, 9(3), pp. 15-19.

Rubin, J. and Rubin, S., 2005. *Qualitative interviewing*. London: Sage.

Rugg, G. and Petre, M., 2007. *A gentle guide to research methods*. London: Open University Press.

Saffady, W., 2000. The status of library automation at 2000. *Library Technology Reports*, 1(36), pp. 51-58.

Saracevic, T., 2000. Digital library evaluation: towards an evolution of concepts. *Library Trends*, 23(4), pp. 47-56.

Saracevic, T., 2004. *Evaluation of digital libraries: an overview.* [online] Available at: <http://dlib.ionio.gr/wp7/ws2004 Saracevic.pdf> [Accessed 10 January 2009].

Scammell, A., 1997. *Handbook of special librarianship and information work*. London: Aslib.

Sdi, A., 2006. Libya information infrastructure: charting into the information age. *SDI Africa Newsletter,* 1(5), pp. 124-131.

Silverman, D. and Marvasti, A., 2008. *Doing qualitative research: a comprehensive guide*. London: Sage.

Singh, K., 2007. *Quantitative social research methods.* New Delhi: Sage.

Singh, S. and Kumar, K., 2005. *Special libraries in the elctronic environment*. New Delhi: Book Well.

Singh, y., 2006. *Fundamental of research methodology and statistics*. New Delhi: New Age International.

Smith, E. and Larsen, G., 1991. *Designing qualitative research* . Thousand Oaks: Sage.

Solis, C., 2005. Digital library evaluation. *Library Trends*, 38(2), pp. 243-252.

Somekh, B. and Lewin, C., 2005. *Research methods in the social science*. London: Sage.

Source Forge. *Greenstone software*. [online] Available at: <http://sourceforge.net/> [Accessed 20 October 2008].

Stevenson, J., and Shelton, S., 2005. *Structured interviews*. [online] Available at: <http://pareonline.net/getvn.asp?v=5&n=12> [Accessed 27 October 2008].

Strauss, J., 1972. Scientific and technical libraries. *Library Science*, 2(3), pp. 6-13.

Sudan Open Archive. [online] Available at: <http://www.sudanarchive.net/> [Accessed 03 October 2008].

Sudanese Associations for Libraries and Information sciences (SALIS). [online] Available at: <http://puka.cs.waikato.ac.nz/cgi-bin/sali/library> [Accessed 21 November 2008].

Twati, J., 2006. The impact of organisational culture innovation on the adoption of IS/IT: the case of Libya. *Journal of Enterprise Information Management*, 3(2), pp. 23-35.

UNESCO. Free & Open Source Software Portal. *GENISIS Software.* [online] Available at: <http://portal.unesco.org/ci/en/ev.phpURL_ID=531&URL_DO=DO_TOPIC&URL_SECTION=201.htm> [Accessed 23 October 2008].

UNESCO. Free & Open Source Software Portal. *WEBLIS Software.* [online] Available at: <http://portal.unesco.org/ci/en/ev.phRL_ID=16840&URL_DO=DO_TOPIC&URL_SECTION=201.html> [Accessed 17 October 2008].

UNESCO. Free & Open Source Software Portal. *GENISIS and WEBLIS DB Publishing.* [online] Available at: < http://www.unesco-ci.org/cgi-bin/portals/foss/page.cgi?d=1> [Accessed 13 Junaury 2009].

UNESCO. Free & Open Source Software Portal. *CDS/ISIS Database Software.* [online] Available at: <http://portal.unesco.org/ci/en/ev.php> [Accessed: 13 January 2009].

UNESCO. *World Summit on the Information Society* (WSIS). [online] Available at: <http://www.itu.int/wsis/index.html.> [Accessed: 21 January 2008].

Vanderstoep, S. and Johnston, D., 2009. *Research methods for everyday life: blending qualitative and quantitative approaches.* San Francisco: Jossey &Bass.

White, S., 1984. *Managing the special library*. New York: Knowledge Industry Publications.

Witten, I. et al., 2006. *Greenstone tutorial exercises: marco file for designing greenstone user interface.* [online] Available at: <http://www.greenstone.org/exercises\all_tutorials.html> [Accessed 23 November 2008].

Witten, I., 2006. Digital libraries for the developing world. *Interactions*, 2(4), pp. 47-49.

Witten, I. and Bainbridge, D., 2003. *How to build a digital library*. San Francisco: Morgan Kaufmann.

Wittwer, R., 2001. Specail libraries: how to survive in the twenty first century. *The Eelctronic Library*, 4(19), pp. 221-225.

Younis, M., 2002. The perception and administrative effect of internet usage in Jordanian university libraries. *Online Information Review*, 26(3), pp. 193-208.

Zeger, F. and Kaufman, N., 2007. *Research methods for the social and behavioral sciences*. New Jersey: John Wiley & Sons.

APPENDIX

University of Strathclyde
Department of Computer and Information Sciences

Questionnaire for gathering information about ICT infrastructures and library services in particular special libraries in Libya

Dear Sir/ Madam

I am distributing this questionnaire in order to collect data and information about information services and ICT infrastructure in particular special libraries and information centres in Libya for the purpose of a scientific research. The collected information will assist the researcher in carrying out a scientific research will be submitted in fulfillment of the degree of the PhD in the field of information and library studies captioned:

Information services for special library users in Libya

I would like to emphasize that the information collected through this questionnaire will be of a great scientific significance as it will add essential value for this scientific research. I would also like to emphasize that all information provided in response to this questionnaire will be reported anonymously and treated in the strictest confidence and will not be used for any other purpose.

Thank you in advance for your cooperation and assistance

Ramadan Elaiess

Section one: General information

Name of organization
Postal address
Telephone(s)
Fax
E-mail address
World Wide Web address

Organization's primary business category
Departments / subdivisions
Libraries or/and information centres at the same location
Library units or divisions
Title of information unit (eg,library, information centre,etc)

Information about the manager

Title
Management
Department
Qualification
Experience

Section two: the library/ information centre.

1- Hours and days of operation ……..
2-Does the library/ information centre primarily aim to serve?
(***Please tick all that apply***)

One department only your location ☐		**Some departments on your location** ☐			
All departments on your location ☐		**External Clients** ☐		**General public** ☐	
Other, please specify					

3- How many users approximately are targeted to use the library / information centre?

…… ……

Section three: Staffing

1-Number of staff: Professional ……
Non professional …….
2- Nationality and gender of staff:

Nationality	*Gender*	*number*	*Gender*	*number*
Libyan	**Male**		**Female**	
Arab	**Male**		**Female**	
Foreigners	**Male**		**Female**	

3- How many staff with library and information qualification? ……...
- How many staff with subject qualification? ……..

Section four: The stock

Please specify your library stock according to your best estimate in the form provided below

Print resources	*Number of Arabic titles*	*Number of English titles*	*Number of copies*
Books			
Periodicals			
Theses &Dissertations			
Dictionaries			
Reference sources			
Government publications			
Manuscripts			
Documents			
Maps			
Research papers			
Reports			
Patents			
Other			

Electronic resources	*Number of Arabic titles*	*Number of English titles*	*Number of copies*
Audio and video cassettes			
CD-ROMs			
DVD			
Microfiche			
Microfilms			
Online databases			
Digital sources			
Other			

2- Library's collection in Arabic language …… %
- Library's collection in other languages …… %

3- Annual increasing ratio of library's collection…….
4- Has your book collection in the past three years:

Increased in size ☐ **remained the same size** ☐ **reduced** ☐

5- How many books did you acquire last year? ……..

Digital collection

1- Does your library have digital resources in its collection?

Yes ☐ ***No*** ☐

2- If no, please indicate your main reasons for not acquiring of digital materials?

……
……
……
……

3- Please indicate the proportion of digital materials in comparison to conventional resources in your library

- Digital materials……..%
- Conventional resources……. %

4-Do you expect to acquire digital materials in the next five years?

Yes ☐ ***No*** ☐

If yes, please indicate how you would acquire these materials?

Creation in- house ☐ **Donation** ☐

Harvesting from the web ☐ **Converting from traditional resources** ☐

Purchase ☐

Library's Budget

1- Does your library have a separate budget?

Yes ☐ No ☐

- Does the allocated budget suffice the library needs and requirements?

Yes ☐ No ☐

- How much have you spent last year on the following items?

Books ……% **Serials ……..%** **On-line services……. %**

What kind of library equipments does your library own and how many are of them?

Library equipment	*Number*	*Library equipment*	*Number*
Microfilm reader		**Film projector**	
Microfiche reader		**Slide projector**	
Tape recorder		**DVD player**	
Cassette player		**Overhead projector**	
Photocopying machines		**CD Player**	

Other, please specify

Section five: Technical procedures

1- Are the collections in your library classified?

Yes ☐ ***No*** ☐

2- What classification system does your library currently use? What edition?

☐ **Dewey decimal classification DDC** **Library of congress classification system** ☐

Local plan ☐

Other, please specify

3- What type of catalogues is used in your library?

Dictionary catalogue ☐ ***Online catalogue - OPAC*** ☐

Subject catalogue ☐ | Title catalogue ☐ | Author catalogue ☐

Other, please specify

4- Which cataloguing rules is used for cataloguing your library materials?

-AACR2 ☐

-Special catalogue rules ☐

5- Which subject headings list is used for cataloguing your library materials?

Library of Congress subject headings ☐ **Sears subject headings list** ☐

Arabic subject headings list ☐

Other, please specify

6- Acquisitions

1- What means are usually used for acquiring library materials?

Purchasing ☐ **Exchange with other libraries** ☐

Donation ☐ **Corporation publications** ☐

Other, please specify

2- Please clarify the percentage of using the above mentioned means

Purchasing ……% Exchange ……..% Donation…… %

3- Who is responsible for selecting library materials?

The librarian ☐ **Library's committee** ☐

The manager of the information unit ☐ **Subject qualification librarian** ☐

Other, please specify

User services

5-1- Reference services

1- How do you provide reference services for library users?

Traditional reference desk staffing	☐	**E-mail**	☐
Telephone	☐	**Chat (including video, audio)**	☐

Other, please specify

2- Who is responsible for providing reference services?

-Researchers (librarians; library assistants) to gather the information to answer questions ☐

-A co-ordinator to assign questions and to monitor answers; to schedule staff ☐

3-How many enquires do you estimate were answered from the library this year?

…….

5-2 Current awareness service

1- Do you provide current awareness service for your library users? Please tick.

Yes ☐ ***No*** ☐

2- If yes, what kind of current awareness services is commonly provided?

Books alert	☐	**Articles alert**	☐
Internet resources alert	☐	**symposia and conference papers alert**	☐

Other, please specify

3- Specify the style of current awareness provided for library users

Print current awareness	☐	**Electronic alert services**	☐

If No, please indicate the reasons preventing the provision of this type of services

…….

…….

…….

…….

5-3 Selective dissemination of information service

1- Do you provide SDI services for your library users? Please tick

Yes ☐ No ☐

1- What would be the best form for disseminating information for the users in your organization? (Please tick all that apply)

Current content	☐	**Fact sheet**	☐
Small leaflet	☐	**Newsletter**	☐

Other, please specify

If No, please indicate the reasons preventing the provision of this type of services

……
……
……
……
……

5-4 Translation services

1- Does the library provide any kind of translation services?

Yes ☐ No ☐

If yes, please explain how these services are provided?

At normal price ☐	**Gratis** ☐	**At a nominal cost** ☐

Such operations are carried out through:

A special section for translation services ☐	**Cooperation with commercial offices for translation** ☐

If no, indicate the reasons preventing the provision of this type of service from your point of view

Lack of special section for translation ☐

Lack of resources, both financial and human, ☐

The absence of cooperation programs with commercial offices for translation ☐

Other, please specify

5-5 indexing and abstracting services

1- Does your library provide this type of services?

Yes ☐ No ☐

These services are provided through one or more of the following: ***please tick all that apply***

-providing of abstracts on scientific periodicals and journals ☐
-providing of abstracts on scientific research papers ☐
-providing of abstracts on reports and conferences papers ☐
-providing of abstract on Thesis ☐
-Abstract bulletin issued by the scientific library ☐
Others……
……

-If No, please indicate the reasons preventing the provision of this type of services

……

……

……

……

……

Book circulation service

- What is the maximum number of books that an employee may take out of the library at a time?

0 - book ☐ | ***1 – 2 books*** ☐ | ***3 – 5 books*** ☐

6 or more books ☐ | ***No maximum*** ☐

- What other materials may users take out of the library?

Reference materials ☐ | ***Periodicals*** ☐ | ***Computer software includes CD-Rom and DVD*** ☐

Non of the above ☐

-Does your library participate in any of the following interlibrary loan programmes?

Interlibrary loan programme with high schools in the state ☐

Interlibrary loan programme with colleges and universities in the state ☐

Interlibrary loan programme with other corporations and institutions ☐

Other, please specify

Electronic services:

Are the following electronic services available in your library/ information centre?

Online catalogue ☐ | ***Other libraries online catalogue*** ☐

Internet access ☐ | ***Business – management- science- humanities- engineering data bases (e.g. ERIC , Science direct)*** ☐

General articles and news database ☐ | ***Reference and bibliography database (e.g. encyclopaedia , dictionary)*** ☐

Electronic full - text books , journals or magazines ☐

Section six: networking and manipulating of data and information.

1- How many computers do your library or the management under your authority own? *Please specify all the figures of hard ware*

.....

2- Areas of computer use: ***Firstly: library use*** *(please tick all that apply)*

For activities	
Word processing ☐	**Spreadsheet** ☐
Administrative ☐	**Training and education** ☐
Other, please specify	

(Please tick all that apply)

For managing collections	
Providing electronic library services ☐	**Information storage and retrieval** ☐
circulation of books and periodicals ☐	**Data basis management** ☐
For various technical procedures ☐	
Other, please specify	

Secondly: general use by library patrons *(please tick all that apply)*

Internet ☐	***Library/internal resources*** ☐	***External resources*** ☐
Word processing ☐	***Training and education*** ☐	
Other, please specify		

3-Does the library connected to the WWW?

Yes ☐ ***No*** ☐

If yes, how does it connect?

Local LAN ☐	**Telephone** ☐	**Satellite** ☐

4-If the library or the department's computers were connected to local LAN, how many computers are connected from the total number which mentioned in question number one?

.....

5- Are the computers connected to other information networks?

Local ☐	National ☐	International ☐

	Name of provider	*Connection medium*	*Type of exchanged data*
1-		Telephone ☐ LAN ☐ Satellite ☐	
2-		Telephone ☐ LAN ☐ Satellite ☐	

6-Does your library have a web site?

Yes ☐ ***NO*** ☐

7- Does your library have any computer data base?

Yes ☐ ***No*** ☐

If yes, ***please fill in the following table:***

Data base subject	*Number of Records*	*Coverage*	*Data sources*
		Comprehensive ☐ Partial ☐	
		Comprehensive ☐ Partial ☐	
		Comprehensive ☐ Partial ☐	
		Comprehensive ☐ Partial ☐	

8- Specifications and types of hard ware used in the department in general:

Type	Operating system	Hard ware capacity	Processor speed	Number of computer users	Number of hard ware

F.D Drivers		*CD Drivers*			*DVD Drivers*			*CD- Rewritable*		
Type	No	Type	NO	Speed	Type	NO	Speed	Type	NO	Speed

Printers		Terminals	
Type:	NO:	Type:	NO:
Type:	NO:	Type:	NO:
Net work Cards		**Modems**	
Type:	NO:	Type:	NO:
Type:	NO:	Type:	NO:
Tape stream		**Other**	
Type		**No**	

9- Please indicate the availability of the followings:

Themes	*Available*	*Shortage*	*Not available*	*Remarks*
Budget	☐	☐	☐	
IT specialists	☐	☐	☐	
Hard ware and other Equipments	☐	☐	☐	
Soft ware	☐	☐	☐	
Coordination with other Units	☐	☐	☐	
Availability of information resources	☐	☐	☐	
Other: Please indicate				

10- In your opinion, what priority should the library give each of the following?
Please tick the number that gives an indication of your assessment.

1 – Don't know	*2 - 3 Low priority*	*4 – 5 Very high priority*

L. Services	*1*	*2*	*3*	*4*	*5*
Availability and accessibility of library staff					
Accuracy of information services					
Timeliness of information services					
Information alert services					
Interlibrary loan					
Retrospective search					
On-line search and access to online databases					
Translation services					
Bibliographic services					

11- Please indicate numbers of staff competent with each technology

Technology	**Highly competent**	**Competent**	**Not competent**
Online cataloguing			
CD – ROMs			
Online databases			
Internet PC software			

12- Specify the need and the importance of the following themes:

Themes	*Essential*	*Desirable*	*Not necessary*	*Remarks*
Training employees for online cataloguing	☐	☐	☐	
Training employees for using of computer	☐	☐	☐	
Training employees for electronic documentary	☐	☐	☐	
Training employees for statistical assignments	☐	☐	☐	
Training employees for making use of data and analysing available information	☐	☐	☐	

Building digital collections

1-Which of the following resources would you like to be available in electronic form?

- Most frequently used items? Yes ☐ No ☐

If yes, choose from the following list all that apply

Information Resources

Periodicals	☐	**scientific journals**	☐
Books	☐	**Conference papers**	☐
General references	☐	**Literature reviews**	☐
Reports & conference papers	☐	**Official publications**	☐
Statistics	☐	**Thesis& Dissertations**	☐
Patents	☐	**Standards**	☐

Other, please specify

- Most invaluable items

Contracts	☐	**Rare reports**	☐
Rare documents	☐	**Internal correspondence**	☐

2- If you were asked to build digital collection, what sort of things do you need?

Hardware and software	☐	**User training**	☐
Staff training	☐	**Legislation for copy right materials**	☐
		Information resources	☐

University of Strathclyde
Department of Computer and Information Sciences

Questionnaire to be completed by special library users in Libya to collect data about their opinion of special library services

Dear User

I am distributing this questionnaire in order to collect data and about users' view of the services presented to them in some targeted special libraries in Libya. The collected data will assist the researcher in carrying out a scientific research will be submitted in fulfillment of the degree of the PhD in the field of information and library studies captioned:

Information services for special library users in Libya.

I would like to emphasize that the data collected through this questionnaire will be of a great scientific significance, as it will add essential value for this scientific research. I would also like to emphasize that all information provided in response to this questionnaire will be reported anonymously and treated in the strictest confidence and will not be used for any other purpose.

Thanks in advance for your cooperation and assistance

Ramadan Elaiess

Section one: Personal information:

Department

Occupation

Degree

Job title

Gender ***Male*** ☐ ***Female*** ☐

What age group are you in?

Age ***Under 25*** ☐ ***26 - 45*** ☐ ***46 - 60*** ☐ ***Over 60*** ☐

Language proficiency:

Language	***Very good***	***Good***	***Above average***	***Average***	***Not familiar with***
English					
French					
German					
Italian					
Spanish					

• Do you generally use the library?

Everyday	**Once a week**	**Twice a week**	**Once a month**	**Hardly ever**
☐	☐	☐	☐	☐

Section two: using of information resources:

1-Select from the following terms what can precisely reflect your needs for the resources and information provided by your library: ***Please use the following five point scale.***

1– scarcely	**2- below average**	**3-average**	**4- above average**	**5 – immense**
☐	☐	☐	☐	☐

2- To what extent do you think the library holdings are satisfactory? ***Please use the following five point scale.***

1-Very unsatisfactory	**2**	**3**	**4**	**5- very satisfactory**
☐	☐	☐	☐	☐

3- If the collection in your view were unsatisfactory, ***please indicate the reasons?***

A : ***Inadequate subject's coverage*** ☐

B : ***Lack of up to date resources*** ☐

C : ***Lack of materials of interest*** ☐

D : ***Library collections is not well organized*** ☐

Other , please specify

4-In which ways do the library resources benefit you? ***You can choose more than one***

doing scientific research	☐	**self intellectual**	☐
preparing work reports	☐	**work requirements**	☐

updating information on a particular specialized field ☐

Other, please specify

5- Classify and categorize the following information resources according to your needs and requirements:

Information resources	*Essential*	*Desirable*	*Nice to have*	*Negligible*
Legislations	☐	☐	☐	☐
Stock price				
Financial data				
Statistics				
Newspaper				
Organizations/companies house data				
scientific journals				
Conference papers				
Literature reviews				
Specifications				
Standards				
Books				
Codes of practice				
Health and safety information				
Thesis &Dissertations				

6- Which of the following resources do you frequently use inside your institution?

Please use the provided scale and tick where appropriate

1-Always	*2-Regularly*	*3-Occasionally*	*4-Rarely*	*5- Hardly ever*

Information resources	*1*	*2*	*3*	*4*	*5*
Periodicals					
Books					
General references					
Reports & conference papers					
Audio visual materials					
Patents					
E-resources					
Thesis& Dissertations					
Official publications					

7- Which of the following resources is not available in your library and you have to look for outside your institution's library? (***Please choose all that apply***)

Information Resources			
Periodicals	☐	**scientific journals**	☐
Books	☐	**Conference papers**	☐
General references	☐	**Literature reviews**	☐
Reports & conference papers	☐	**Electronic journals**	☐
Audio visual materials	☐	**Digital materials**	☐
Patents	☐	**Electronic Books**	☐
Thesis &Dissertations	☐	**Statistics**	☐
Abstract bulletins	☐	**Specifications**	☐
Official publications	☐	**Standards**	☐
Legislations	☐	**Newspapers**	☐

8- If you were asked to choose information resources to be available in electronic form on a digital library, what sort of resources would you choose?

Information resources	*Essential*	*Not essential*	*Information resources*	*Essential*	*Not essential*
scientific journals	☐	☐	Books	☐	☐
Newspapers			Periodicals		
Official publications			Abstract bulletins		
Legislations			General references		
Reports & conference papers			Literature reviews		
General references			Specifications		
Patents			Standards		
Other, please specify					

9- Specify and categorize the following services according to their importance to your work and research. ***Please use the provided scale and tick where appropriate***

1- very important	*2- important*	*3- less important*	*4- not necessary*	*5-not needed*

L. Services	*1*	*2*	*3*	*4*	*5*
Current awareness					
Selective dissemination of information					
Book circulation service					
Reference services					
Interlibrary loan					
Retrospective search					
On-line search					
Translation services					
Bibliographic services					

10- In your opinion, what priority should the library give each of the following?
Please tick the number that gives an indication of your assessment.

1 – Don't know	*2 - 3 Low priority*	*4 – 5 Very high priority*

L. Services	*1*	*2*	*3*	*4*	*5*
Availability and accessibility of library staff					
Accuracy of information services					
Timeliness of information services					
Information alert services					
Interlibrary loan					
Retrospective search					
On-line search and access to online databases					
Translation services					
Bibliographic services					

11- Do you think the deficiency of the above mentioned services could have a negative influence on:

The organization ☐ *Employees performance* ☐

Research & development ☐ *Have no influence* ☐

Other, please specify:

12- To which extent do you reckon the coverage of the library's collection is satisfactory and meets your needs? ***Please use the scale provided.***

1-Very unsatisfactory	2	3	4	5- very satisfactory
☐	☐	☐	☐	☐

13- If your organization did not have a library or information centre, you would get your information from:

Using internet yourself ☐ *Using databases yourself* ☐

Using reference material in other library ☐ *Other professional colleagues* ☐

Would not get research materials ☐

Other, please specify:

Section three: Using of computers and the internet

1- To what extent are you knowledgeable about using computers?

No knowledge	Minimal knowledge	Adequate knowledge	High knowledge	*Expert*
☐	☐	☐	☐	☐

2- How did you learn to use computers?

By self learning	☐	***Attending courses***	☐
Through the educational system	☐	***Other professional colleagues***	☐

Other, please specify

3- Select from the following mentioned applications the most regularly used

Language programming	☐	***Data processing***	☐
Spreadsheet	☐	***Three dimension***	☐
Word processing	☐	***E-mail***	☐
Surfing the net	☐	***Stimulation and programmers designing***	☐

Other, please specify:

4- To what extent are you knowledgeable about using the internet?

No knowledge	Minimal knowledge	Adequate knowledge	High knowledge	*Expert*
☐	☐	☐	☐	☐

5- How did you learn to use the Internet?

By self learning	☐	***Attending courses***	☐
Through the educational system	☐	***Other professional colleagues***	☐

Other, please specify:

6- For which types of information is the internet most commonly accessed? ***Please tick all that apply***

Electronic journals	☐	***Organization home pages***	☐
Alerting services	☐	***Government data***	☐
University library catalogue	☐	***Catalogues of goods and services***	☐

Other, please specify

7-Please indicate the level of use of the following IT applications and identify to what extent are you acquainted with the following terms?

Please use the scale provided and tick where appropriate

No knowledge	*2- Minimal knowledge*	*3-Adequate knowledge*	*4-High knowledge*	*5- Expert*

Themes	*1*	*2*	*3*	*4*	*5*
Distance learning					
E-Learning					
Information systems					
E- Conferencing					
E-mail					
Chat					
Intranet					
Internet					
Digital libraries					
E- Journals					
Virtual Reality					
Virtual Environment					
Hyper text					
Search Engines					
Google					
E-resources					
Microsoft office					
Website design					

8- In general, are you satisfied with the services provided by your library?

Yes ☐ To some extent ☐ No ☐

- If no, please indicate the reasons ***(choose all that apply)***

A- Librarians unfriendly ☐

B- The library materials is not well organized ☐

C- The library collections do not meet your needs ☐

D- Unappealing facilities ☐

Other, please specify

E- Library services is weak in general ☐

F- Librarians are not qualified enough and lack of technical knowledge ☐

G- Difficulty in finding what you looking for due to lack of good quality retrieval tools ☐

University of Strathclyde
Department of Computer and Information Sciences

Questionnaire for gathering information about information policies and strategies in particular organisations and institutions in Libya

Dear Sir/ Madam

I am disseminating this questionnaire in order to collect data and information on information policies and strategies in particular Organizations and Institutions in Libya. The collected information will assist the researcher in carrying out a scientific research will be submitted in fulfillment of the degree of the PhD in the field of information and library studies captioned:

Information services for special library users in Libya.

I would like to emphasize that the information collected through this questionnaire will be of a great scientific significance as it will add essential value for this research. I would also like to emphasize that all information provided in response to this questionnaire will be reported anonymously and treated in strict confidence and will not be used for any other purpose.

Thanks in advance for your cooperation and assistance

Ramadan Elaiess

Section one: *Developing and maintaining of information infrastructure within the organization*

1- Indicate whether the object which is under your authority has a written document/ documents to direct you how to maintain and to develop information infrastructure within this object

☐ Yes
☐ No

Any further remarks

.....

.....

2- Does the document cover the following points?

	Yes	***No***
• Information networks (Establishment and supporting)	☐	☐
• Reliability (Authentication of privacy and content)	☐	☐
• Specification of the targeted information that need to be contained in the n		
•Pattern of entitlement for managers and employees	☐	☐
• Computerization of the library (library system and support)	☐	☐
• Online services	☐	☐
• Accessibility of online collections	☐	☐
• Preservation of digital items	☐	☐

other, please specify

.....

.....

.....

Section two: *Responsibility of intellectual property and appropriate usage of copyright materials*

1- Indicate whether the object which is under your authority has a written document/ documents that can assist you in the usage of copy right materials?

☐ Yes (If yes, please attach a copy of the document with this questionnaire)
☐ ***No*** *(*If no, move to the next section)

Any further remarks

.....

.....

.....

Object: means here any part of the Organization e.g. unit / management / library/ department.
Document: means in this context a plan/ text/ instructions / document/documents/ work frame.
Information infrastructure: includes any policies / strategies / labour force / users/ resources in the field of information science.

2- Does the above mentioned document include the requirements of the following intellectual property? Yes No

• Publications of employee's work in all different shapes ☐ ☐
• Employee's research papers ☐ ☐
• Digital items designed by the library or materials that have been transformed into digital form. ☐ ☐
•Developed systems or programmes by employees that are designed to be used within the organization framework. ☐ ☐
• Other, please specify

……
……

Section three: *Supporting and applying of policies related to suitable usage of copy right materials.*

1- Indicate whether the object which is under your authority has a written document/ documents to direct you in applying fair usage of copy right materials.

☐ **Yes** (If yes, please attach a copy of the document with the questionnaire)
☐ ***No (***If no, move to the next section)
☐ Any further remarks

……
……..

2- Does the document cover the following points? ***Yes*** ***No***

• Fair use of copy right materials for research and instruction ☐ ☐
• Fair use in the context of electronic learning for developing research activities ☐ ☐
•Licensing for usage of copy right materials ☐ ☐
• Licensing for copying and printing of copy right materials ☐ ☐
• Other, please specify

……
……

Section four: *Information technology infrastructure (includes information network, hardware and software, available online collection)*

1- Indicate whether the object which is under your authority has a written document/ documents for establishing information system containing information resources

☐ **Yes** (If yes, please attach a copy of the document with the questionnaire)
☐ ***No*** **(**If no, move to the next section)
☐ Any further remarks……
……

2- Do the library/ libraries under your authority have a written document/ documents for developing information technology infrastructure?

☐ **Yes**
☐ ***No***
☐ Any further remarks

……..
……..
……...

- Does the document cover the following points?	Yes	No
- Number of hardware and software	☐	☐
- Networks	☐	☐
-Internet and intranet	☐	☐
-Access control	☐	☐
-Budget	☐	☐

4- Please identify which of the following statements describes information technology infrastructure in your organization?

• The library has a written plan or strategy as partial of the general principle of the organization as mentioned in the second question. ☐
• The strategy of developing the information infrastructure exists as a part of the library plan or strategy. ☐
• The strategy for developing the information technology infrastructure exists as a plan for the digital library which includes other units in addition to the library ☐

5-In case the library has a written plan or strategy for developing information technology infrastructure, please point out whether it covers the following points?

	Yes	***No***
• Information networks (Establishment and supporting)	☐	☐
• Reliability (Authentication of privacy and content)	☐	☐
• Allocated budget	☐	☐
• Number of computers	☐	☐
• Online services	☐	☐
• Accessibility of online collections	☐	☐
• Internet access	☐	☐
• Access control	☐	☐

• Other, please specify

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……

Section five: *protection and conservation of digital items*

1- Identify whether the library/ libraries under your authority have a written document / documents for safeguarding and preserving the digital materials?

☐ Yes
☐ No
☐ Any further comments

……
……

2- Please indicate which sentence of the following statements is more accurate in describing the document / documents pertaining to the object that is under your authority with regard to digital items.

- The document / documents pertaining to the digital items is a part of the general principles of the organization ☐
- The document /documents is specifically designed to preserve the digital items ☐

3- If the library has a document / documents for preserving the digital items, please indicate whether it covers the following points:

	Yes	No
• Library catalogue	☐	☐
• Digital items created in the library	☐	☐
• Digital items harvested from the web	☐	☐
• E- journals	☐	☐

The policy is designed in entirely different way. ***Please clarify***

……..
……..

Section six:

1- Is there any department or sub unit working on the formulation of the document / documents of information policy inside the organization?

☐ Yes
☐ No

2- If yes, please point out which department or unit is responsible for creating and developing that document?

……..…
……..

3- Identify whether the library/ libraries under your authority have a written document / documents regarding training of human resources

☐ **Yes** (If yes, please attach a copy of the document with the questionnaire)
☐ ***No*** **(**If no, move to the next section)
☐ Any further remarks……
……

- Does the above mentioned document cover the following points?

- Library staff training ☐
- Users training ☐
- Type of training courses ☐
- Cost of training courses ☐

- As a manger of the unit, do you have any plane, vision for moving towards an electronic digital library services?

Yes ☐ No ☐

- If yes, please indicate your plane, vision

……
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……

University of Strathclyde
Department of Computer and Information Sciences

Questionnaire to be completed by NOC library users to collect data about their opinion about the constructed digital library

Dear User

I am distributing this questionnaire in order to collect data about users' view of a prototype designed for the NOC central library. The collected data will assist the researcher in evaluating a prototype which is an essential stage in the design framework of a scientific research captioned as

Information services for special library users in Libya.

I would like to emphasize that the data collected through this questionnaire will be of a great scientific significance as it will add essential value for this scientific research. I would also like to emphasize that all information provided in response to this questionnaire will be reported anonymously and treated in the strictest confidence and will not be used for any other purpose.

Thanks in advance for your cooperation and assistance

Ramadan Elaiess

Prototype Evaluation Questionnaire

To evaluate the prototype, please answer the following questions.

Take into account that we are interested in knowing your opinion.

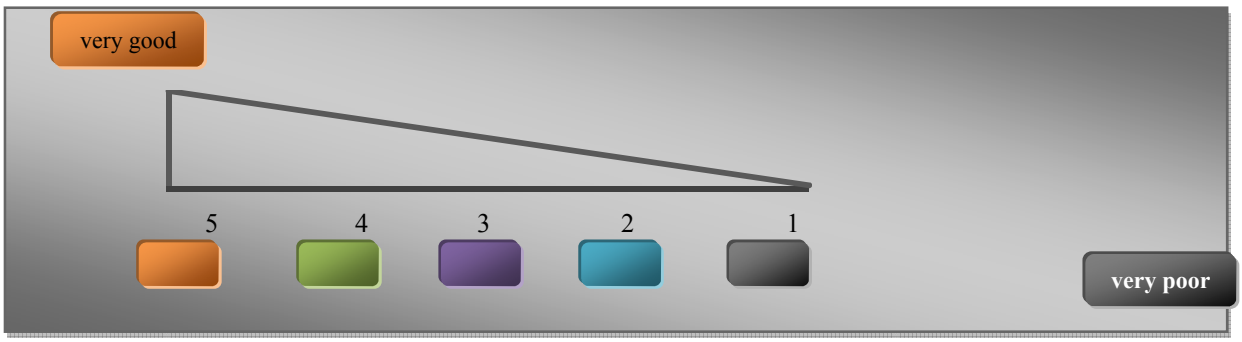
Answer questions freely, and consider there are no right or wrong answers.

Please remember that we are evaluating the prototype you have just used and not you.

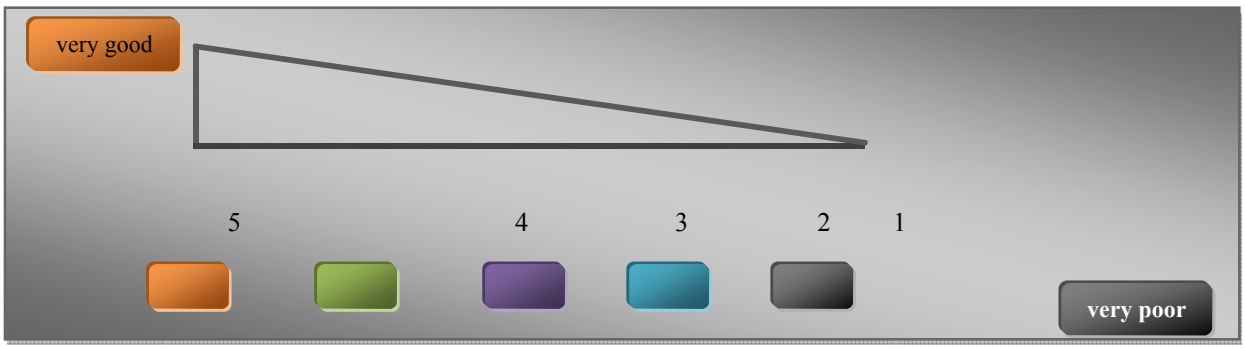
Please remember also that: 1. = very poor 2. = poor 3. = barely acceptable 4. = good 5. = very good.

1- Using the provided five point scale, please asses the strength of the following features;

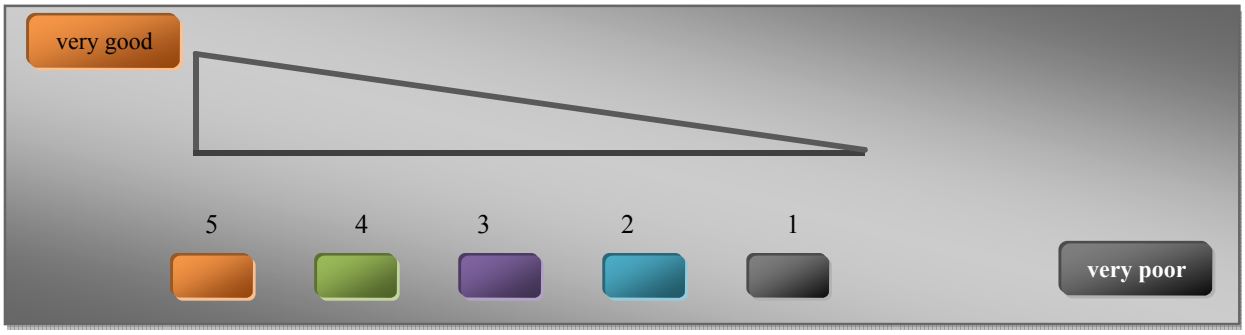
Arabic interface



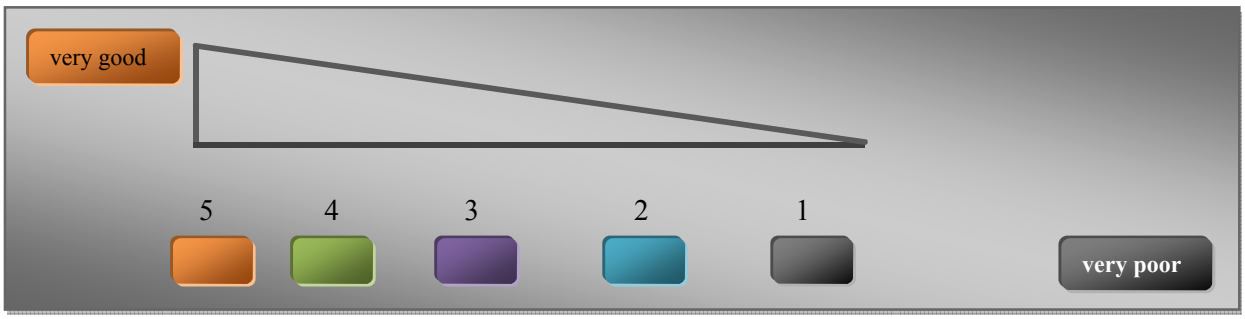
English interface



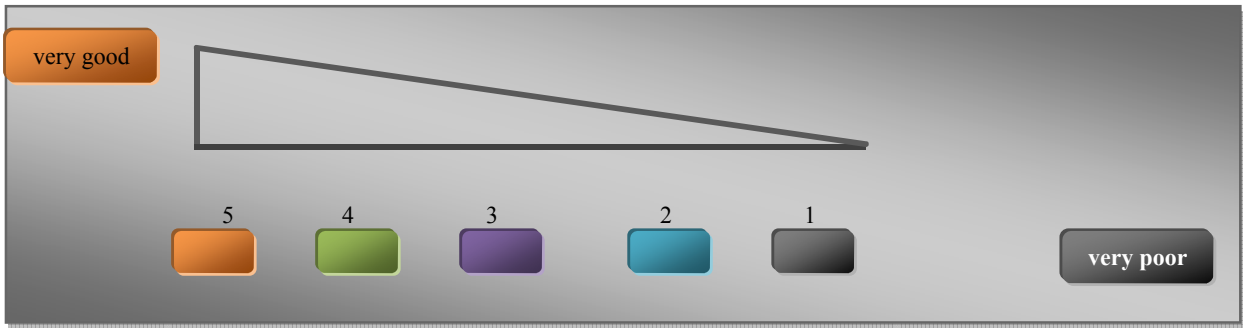
Navigation options (browse facilities)



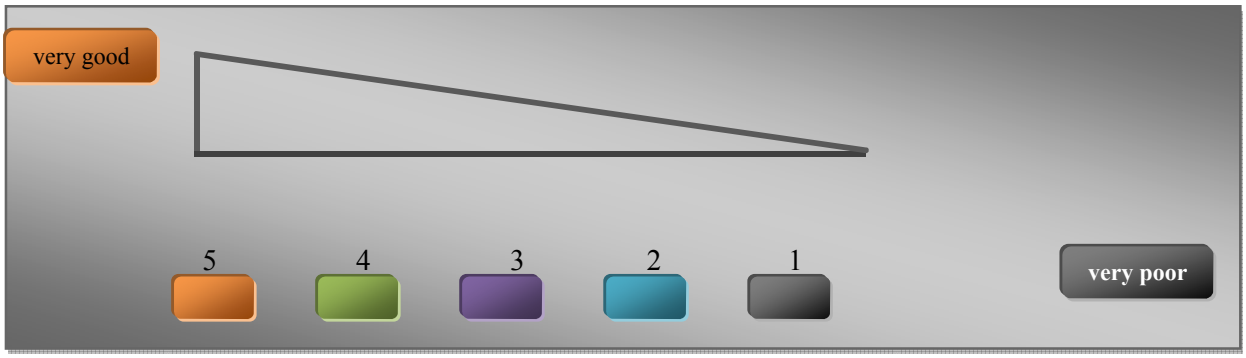
Cross – collection search



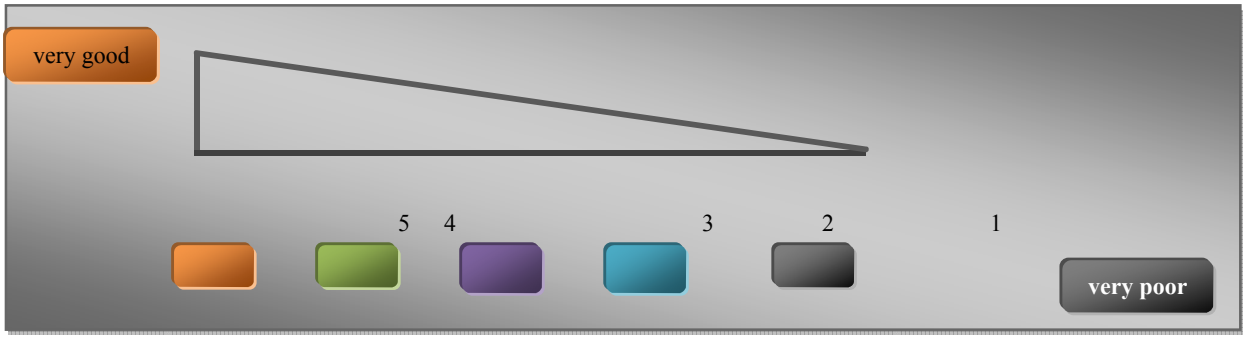
Simple search



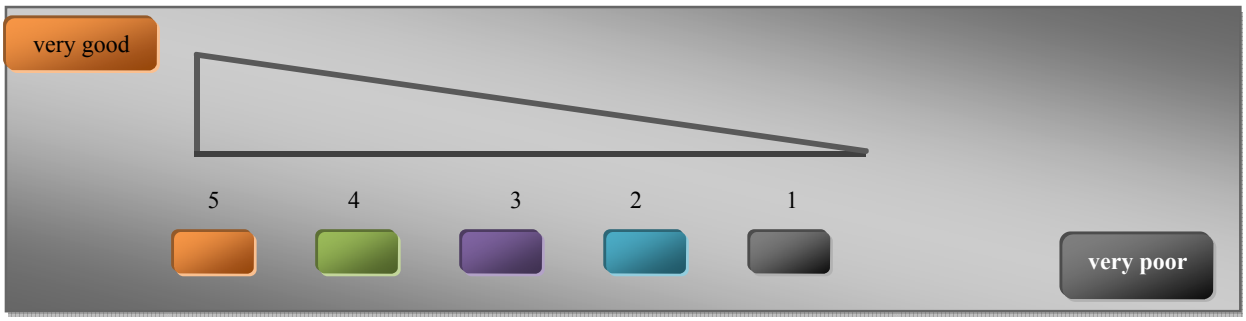
Expert search



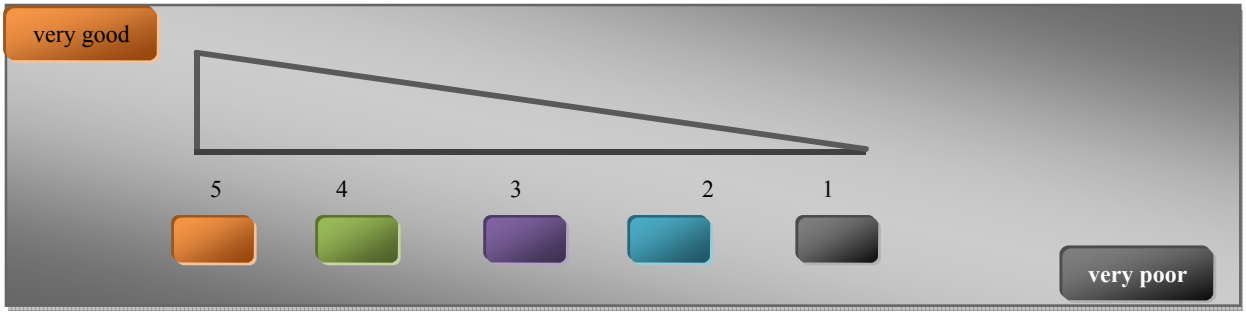
Full text searching



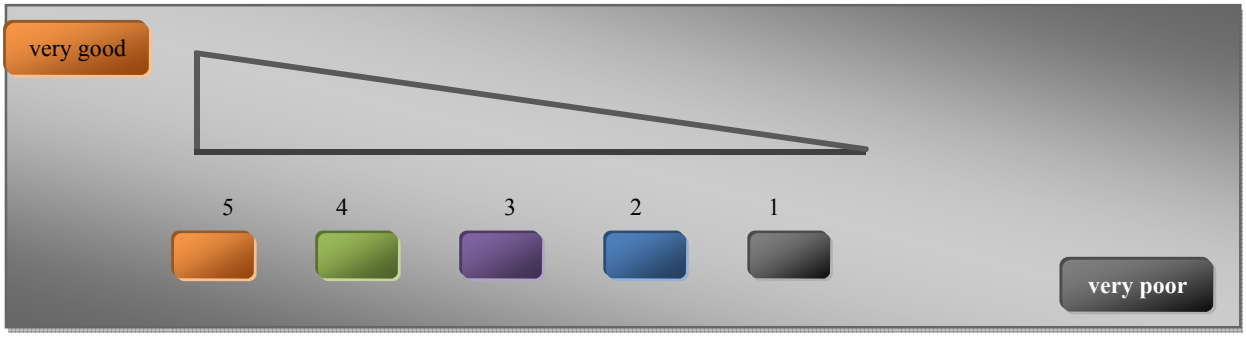
Texts and graphs



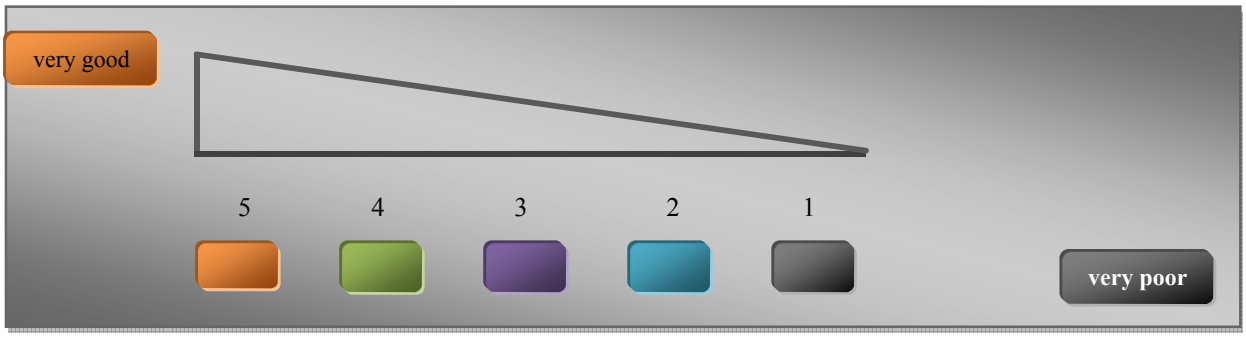
Font size and type of font



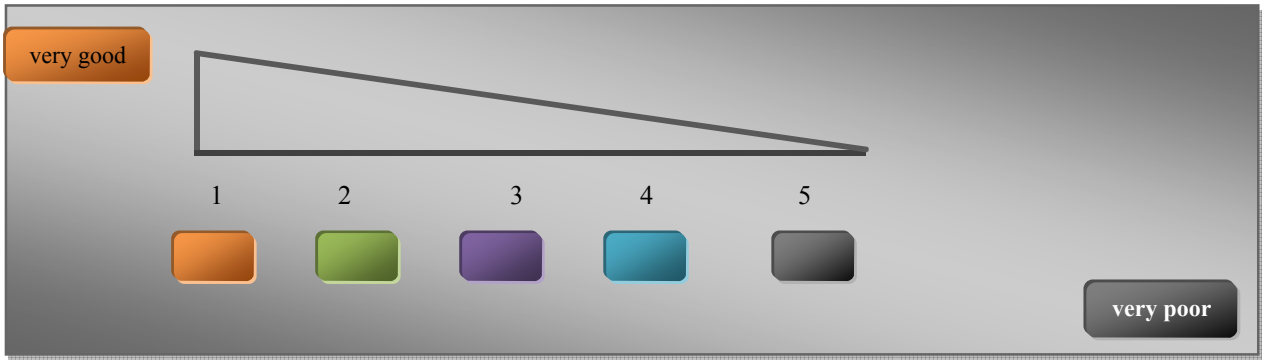
Visual appearance



Preferences



Personalization of the interface



2- Please rate how strongly you agree or disagree with each of the following statements by placing a TICK √ in the square that best matches your opinion.

Please remember that: 1. = strongly disagree 2. = Disagree 3. = Tend to agree 4. =Agree 5. = Strongly agree

Please answer all questions.

Statements	Strongly disagree	Disagree	Tend to agree	Agree	Strongly agree
My experience with the library today was quite pleasurable					
I was able to navigate easily in the digital library					
The results I obtained in my searches were relevant					
The design of the library is clear, simple, and consistent					
Search and browse facilities are good enough for retrieval of information					
The library works fine in both languages					
Personalization of the interface made my experience more enjoyable					
The digital library offers relatable links to other electronic resources					

3- What changes do you reckon are required for enhancement of the library subject to this evaluation?

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