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# An Exploratory study of the benefits and inhibitors of digital libraries in Iraq

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*Edith Cowan University*

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**An Exploratory Study of the Benefits and Inhibitors  
of Digital Libraries in Iraq**

**By**

**Basima Abdulbari Fezaa**

**Masters thesis**

**Edith Cowan University**

**Perth, Western Australia**

**2013**

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## **Abstract**

This research study explores the potential of digital libraries (DLS) in Iraq and identifies inhibitors to adoption. Iraq is an ancient civilisation, with a recorded history of more than 5000 years. The Mesopotamian civilisation and the Babylonian Civilisation (both in Iraq) are amongst the most ancient in the world, and have existed from the times of the ancient Egyptian, Indus Valley, Persian civilisations. Iraq has a rich cultural history, with many rare historical manuscripts, antiques etc., on which many treatises have written and still continues to be a popular subject of research. In its recent history, Iraq has had much turmoil as a result of war, sanctions and internal conflict. In recent years many libraries such as the Iraq National Library and Archive (Dar al-Makhtutat, Dar al-Kutub wa-al-Watha'iq), Bayt al-Hikma, Maktabat al-Awqaf and the Iraqi Academy of Sciences have been looted and burnt. It has been proposed by the government to implement digital libraries to broaden accessibility and preserve documents.

Today the advancement of civilisation and speed of innovation are highly dependent on the availability of information. With increased access to information, even the most under-privileged sections of society will have improved economies. There are numerous investments in infrastructure and improvements in the standardisation of protocols, such as http, that have enabled the sharing of information. One of the predominant tools for storing and allowing access to information is a digital library. Digital library technology has been widely adopted worldwide by governments, universities and private institutions. However, implementation of this technology is seen to be a challenge for developing countries, and particularly those nations affected by conflict. This research study examines the issues related to the implementation of digital libraries in the developing country of Iraq.

Digital libraries are an effective system of collecting, storing, organising and distributing documents. They also provide privacy and security. Digital libraries have been seen to have transformed the delivery of education in Western countries. Some African nations, Arab states, India, Thailand and many others have also benefitted from digital libraries. However, it has been identified in the literature that the implementation and adoption of digital libraries has many challenges in poorer nations.

A review of the extant literature provided the foundation of the conceptual framework for the study. Much of the literature concerning Iraq and developing nations predicted an exploratory study. The ontological and epistemological stance of the researcher and the nature of the phenomenon led to a method of inductive qualitative case study. A semi-structured interview guide was used to obtain data from eight libraries in Iraq. The data were analysed using the constructs developed during the literature review. The researcher's analysis also led to the identification of new constructs that were integrated into the research. Common aspects and issues with regards to implementation of digital libraries were identified.

The results revealed that library staff in Iraq are aware of digital libraries and convinced of their benefits. However, they see many challenges to implementation. Their main concerns are that digital libraries require library staff to have improved knowledge of information and communication technology and English literacy. The researcher found that the capital cost of digital equipment and regulatory issues, such as protection of intellectual property and privacy laws, precluded adoption. The researcher also uncovered broader issues, including the dearth of internet access, poor infrastructure, lack of computers in the population and even the frequent interruption of electricity as major inhibitors to adoption.

The researcher found that the benefits of digital libraries are predicted to be extensive; essentially the DLs are seen to be able to provide free, unhindered 24/7 access from anywhere and that this will contribute positively to the socio-economic development of Iraq. DLs will also empower women who will be able to access information from the privacy of their homes, without facing restrictions imposed by Arab culture. Moreover, the cross-referencing of DLs would save time and help research students. Multimedia used in DLs would also enhance students' learning experience. Furthermore, DLs would showcase the rich cultural heritage of Iraq to foreign nations by linking Iraqi DLs with others in the world.

For digital libraries to be implemented in Iraq the following barriers to effective implementation of DLs need to be addressed: poor literacy, poor English language and lack of ICT skills, funds for digital equipment (servers, software, etc.), and for accessing the DL (client computer, Smartphone, iPad, etc.), lack of infrastructure (including electricity supply and internet capability), and cultural issues. This will require that DLs are endorsed at the highest level of government and planned with the recognition of the unique environmental conditions. Investment in electricity plant and supply, as well as Internet connectivity is a

necessity. Funding by government and foreign donor agencies would be crucial to cover the initial capital expenditure and ongoing running costs of DL. Training needs to be provided to library staff. Finally, it would be necessary to obtain arrangements with other digital libraries around the world and to implement laws of copyright protection.

The study is significant because it reveals many benefits of DLs to Iraq and provides insights about the inhibitors to adoption. The study supports further research into DLs in Iraq by providing constructs, inhibitors and some of the potential of DLs. It also provides a priori for explorative research about DLs in other developing nations.

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## Chapter One – Introduction

*The main reason for the Stone Age to come to an end was the development of new toolsets and skills, and not the shortage of stones. History has been witness to the abandonment of old ideas and adoption of new means when proved to be better. Society is often at the crossroads of identifying new ideas, letting go of traditional ideas, and evaluating new methods. Rather than being a retrospective step, these new ideas will increase integrity, and the toolset associated with the change would be wider and open for more people. This style of approach has significant influence on the operation of libraries, youth education, policy decisions and building future information structures. (Lankes, 2008, p. 667)*

In this chapter, the researcher begins by reviewing existing definitions of digital libraries (DLs). Further, she examines the issues associated with the implementation of DLs. The current conditions and challenges faced in Iraq are discussed with respect to implementation of DLs. Finally, the researcher describes the study and explains the thesis structure.

A DL can be defined as a warehouse of information that is delivered electronically to users who may access it remotely (Rosenberg, 2005). According to Umeozor (2013), information is crucial for all aspects of life, and no person or organisation can work efficiently without information. In any community, libraries are recognised as the foremost home of information. Libraries have been established to render information, shape people's thoughts and opinions and, most significantly, to motivate people to search for information that would lead towards development of individuals and society as a whole. Umeozor (2013) claims underuse of library resources in society and in an academic environment is a matter of concern to policy makers and social scientists.

Information in DLs is controlled using computer processes that select the relevant material to be collected, organize it, ensure availability to users, and store it for future access (Rosenberg, 2005). According to Higgins (2013), it is crucial that everyone, particularly the disadvantaged sections of society, have free unhindered access to information. The principle is that DLs are able to reach a wider audience than traditional libraries and are especially beneficial to disadvantaged sections of society.

In recent years, DLs have become increasingly common. According to Bagudu and Sadiq (2013), universities all around the world are moving towards digital libraries, and the amount of information available is increasing exponentially. The objective of DLs is to widen the range of information that is accessible, have the information accessible at all times, and improve the content through digital means.

As noted by Fuhr et al. (2007), DLs are used for many reasons but predominantly for ease of information access. DLs require library users to have a computer interface and skill in its use (Park et al., 2009). Digital technology and the internet are vital tools for digital learning to be adopted (Oyeronke and Fagbohun, 2013). According to Damilola (2013), even though digital resources offer an increased potential of enhancing and supplementing current programs of distance education, there are many issues working against the effective use of DLs by students of distance education. These issues have to be addressed for distance education to be effective.

Lack of development of countries is characterised mainly by relatively low wealth, comfort and material goods. Other indicators are large inequalities, fast population growth, and high unemployment. According to recent research, as a result of economic stagnation, developing countries often have low levels of education and a high rate of child mortality (Kavulya, 2007). In developing nations, access to libraries of any kind is not always the primary priority (Higgins, 2013). Developing countries are also characterised by a lack of skilled workers, which results in ineffective labour productivity, lack of capital, poor infrastructure and dysfunctional institutional arrangements (Kavulya, 2007).

In developing countries there is a lack of standardization of technology and processes which increases the difficulty of establishing and using DLs (Park et al., 2009). Other factors that hamper the implementation of information systems in developing countries are information technology (IT) infrastructure and social and economic issues. Nonetheless, the last decade has seen rapid advances in information and communication technologies (ICT) and applications established in developing countries. According to Alsabawy, Cater-Steel, and Soar (2013), digital infrastructure has lately been attracting growing attention, as it plays a significant part in the growth of organisations.

## Iraq

Iraq is located in the Middle East, between Iran and Saudi Arabia, with an area of 437,072 square kilometres. Iraq's capital city, Baghdad, is located in the centre of the country. Other major cities include al-Basra in the south and Mosul in the north.

The Iraq demographic profile (2013) identifies the population of Iraq in 2012 to be approximately 31,129,225 million people. The following shows the approximate demographics of Iraq:

### Age

	0-14 years: 37.6% (male 5,959/female 5,751)
	15-24 years: 19.7% (male 3,111/female 3,020)
	25-54 years: 35.4% (male 5,625/female 5,396)
	55-64 years: 4.2% (male 618,165/female 677,947)
	65 years and over: 3.1% (male 450,516/female 517,048)
Population growth:	2.345% p.a.
Ethic groups:	Arab 75- 80%, Kurdish 15-20%, Turkoman, Assyrian, or other 5%
Religions:	Muslim 97%, Christian or other 3%
Languages:	Arabic, Kurdish, Turkmen and Assyrian
Literacy:	age 15 and over can read and write:
Total population:	78.2% (male 86%/female 70.6%):

According to Encyclopaedia of the Nations (2013), education in Iraq at all levels from primary to higher education is free. It is proposed that there are “more than nine” universities in Iraq and 19 technical institutes. Education in Iraq is under the control of the Ministry of Education and the Ministry of Higher Education and Research.

### Historical background

There was significant destruction of Iraqi libraries in April 2003. Many libraries were looted and burnt. The following presents some instances:

***Basra, University Central Library:*** was looted and vandalized; doors and windows were broken, equipment in the reading rooms and the technical services destroyed, and the

collection gathered into piles and burnt. Approximately 75 per cent of the contents of the library were destroyed.

***Mosul, University Central Library:*** was vandalized and looted, but fortunately not burnt. The appeals of religious authorities to return stolen books meant that only 30% of books were lost.

***The National Library of Iraq:*** has been severely damaged; the building (built in 1977) was burnt and looted twice, on 14 April 2003 and one week later. The ground floor, including the main reading room, was ransacked. Catalogues were thrown on the floor and fires started in several places. It was noted that the fires were well-organized, with books gathered into piles and burnt. The fire was hot enough to melt metal shelves and severely damage the structure of the building. It was reported that 1.2 million volumes, including many ancient manuscripts, were destroyed. The image below shows the National Library of Iraq after the looting.



Image 1. The National Library of Iraq post looting

***Al- Awqaf Library (Ministry of Religious Affairs):*** was totally destroyed by fire and probably looted. Only the outer walls still stand. According to anecdotal information, about 40 per cent of manuscripts and 90 per cent of printed books were destroyed. The building is beyond repair. The following image shows the library after it was ransacked.

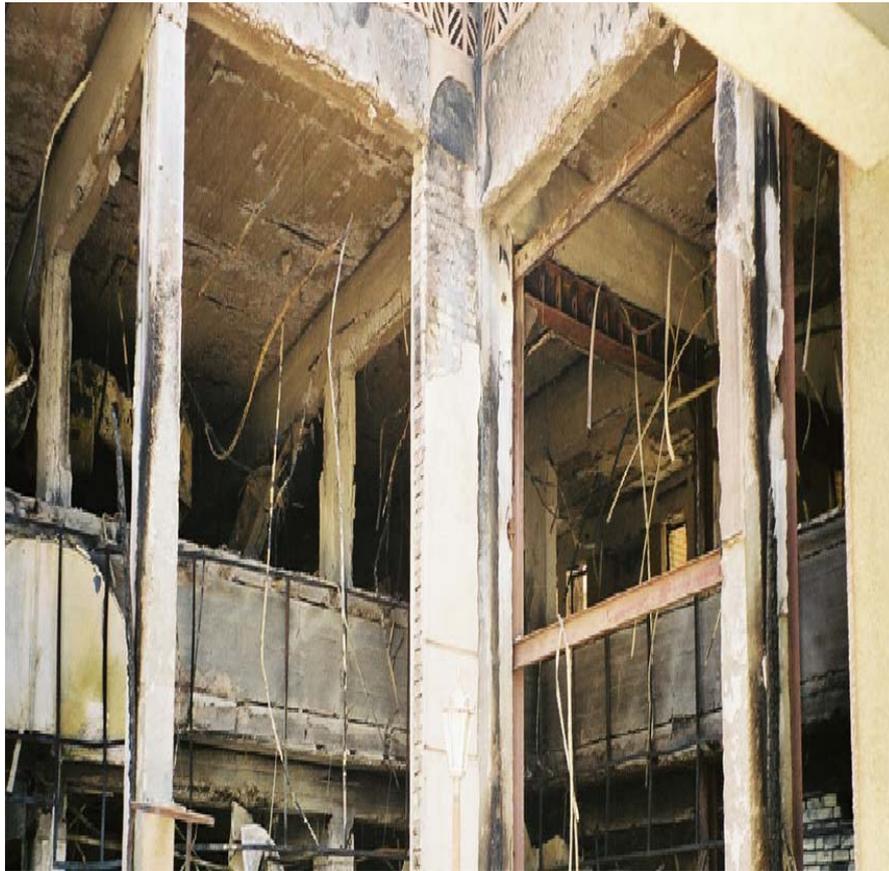


Image 2. Al- Awqaf Library

***Library of Bayt al- Hikma centre:*** was very active in the 1980s for research in the social sciences, law, economics and strategic studies. It is believed to be completely destroyed.

Image 3. shows the library prior to its destruction and Image 4. post destruction.



Image 3. The Bayt al-Hikmah before damage



Image 4. The modern house of Wisdom Bayt al-Hikmah post destruction

Iraq is a developing country that is slowly recovering from international sanctions and war. The researcher believes it has been found to be lacking in effective government systems and agencies. Many elements contribute to the lack of development in Iraq, with political instability being seen as the most destabilising. The situation being aggravated by the absence of the requisite information needed to undertake developmental activities in various sectors. It is believed this has led to social stagnation, declining investment and poor economic growth.

Because Iraq is a nation undertaking a rebuilding process, it is essential the government gives high priority developing educational facilities, and developing skills and knowledge distribution. Alsabawy et al. (2013) argue for more consideration to be given for the part played by digital infrastructure in supporting student services. They give the examples of researchers using online assessment of the university operations, and enabling more means of contacting IT services such as email, chat, IM, electronic lectures. According to Bagudu and Sadiq (2013), one of the consequences of increased IT in Malaysia' libraries has resulted in the increasing number of DLs in universities, such that it has become the norm for universities to offer digital resources to their staff and students. But for these services to be fruitful, the patrons require specific skills, and there needs to be resources that accessibility anytime and anyplace.

Bagudu and Sadiq (2013) predict that the development of DLs will lead to a country with skilled individuals who can help rebuild the economy. However, Iraq lacks library systems that are able to organize, save and classify information. It is therefore important to understand the potential of building effective DLs in Iraq.

## **Study and significance**

The researcher's aim in this study is to explore the potential of DLs in Iraq and to identify inhibitors to adoption. Since the subject is explorative a qualitative case study research approach has been adopted. This entails selecting and recruiting a sample of libraries in different areas of Baghdad and interviewing the senior personnel of these libraries.

The researcher's interest in this topic stems from the obvious differences between the ease of access and openness of information in Perth, Western Australia compared to Baghdad. It is hoped that the outcomes of this research can guide information literacy programs in Iraq as a result of the thesis being submitted to the Ministry of Higher Education and other relevant bureaus in Iraq.

The study has both practical and theoretical significance because ICTs are widely accepted to be an important catalyst for socio-economic development. Having selected a method for undertaking this type of research factors specific to Iraq's need to redevelop its national library system are addressed.

## Structure of thesis

In Chapter One the researcher presents the topic, method and rationale for this study. Chapter Two presents a review of the literature and contains the concepts used in developing the initial theoretical model. In Chapter Three the researcher provides an explanation of the ontological and epistemological assumptions of the study and describes the method of the research. Limitations of the proposed study method are also discussed. In Chapter Four the researcher gathering the results of the cases and discusses additional concepts developed during the course of the study. Chapter Five comprises a cross case analysis and common issues based on the analysis of the collected data. The researcher also explains the perceived benefits and the inhibitors to the implementation of DLs. In Chapter Six, the researcher concludes the study, makes recommendations to enable adoption, and discusses the contribution made by this report and its implication for future studies. See figure1. below for the thesis design.

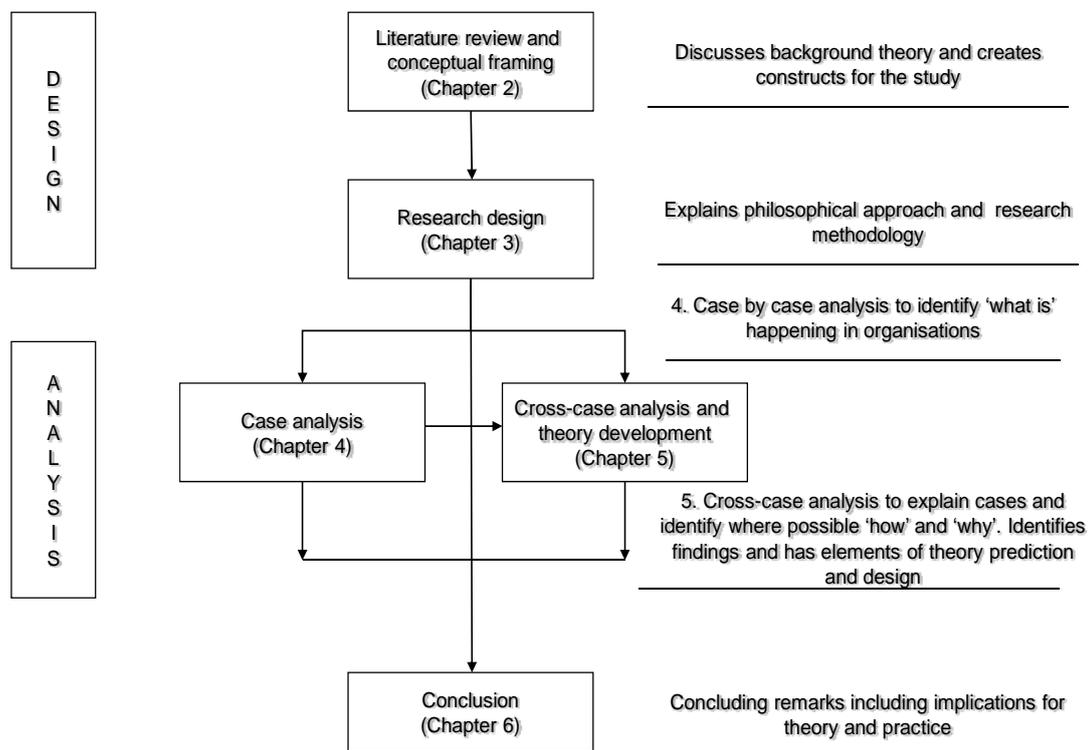


Figure 1. Thesis design – Chapter 1

## Chapter Two – Literature review and conceptual framework

*Digital libraries prove to be the meeting place for many subjects and disciplines such as information management, data access, library science, data systems, document management systems, internet, artificial intelligence, data processing, human-digital contact, and electronic security systems. (Candela et al., 2007)*

This chapter reviews current literature on the implementation of DLs worldwide, including their requirements, advantages, limitations, responsibilities and methods. It also examines the issues associated with digitisation in developing countries, the design of a digital library and notes its crucial components.

### **The nature of DLs**

The conventional roles of a library are recognized as knowledge archival, safeguarding and maintaining the culture, knowledge dissemination, knowledge sharing, information retrieval, education, and social building contacts (Neal, 1997). A DL is a library in which most of the information is available in electronic form, allowing users to access many of the library's services remotely via the internet (Rosenberg, 2005). DLs move hard-copy content to digital format to help improve access (Yeates, 2002).

The DL is a system for presenting collections that can be scanned and stored in media such as floppy and hard disks, tapes and compact discs (Passos, Carolino, & Ribeiro, 2008). In a strict sense, the DL is a means of organizing digital information which relies on the use of up-to-date information, computers and network technology to identify, collect, sort and store information resources (Yao & Zhao, 2009). DLs are also gateways to many external information resources; today, without digitization libraries cannot be described as unified, comprehensive collections (Marcum, 1997). DLs also act as cognitive tools, repositories and information networks (Sumner & Marlino, 2004).

The key goal of a DL is to progress the methods used to collect, store, organize and use widely-distributed knowledge resources that contain diverse types of information and content stored in various electronic forms. The technology of DLs includes digitized resources for finding, processing, sorting, storage, transmission and management of the information (Yao & Zhao, 2009). As hypermedia and multimedia resources DLs are becoming critical processes for intellectual capacity building (Rapp, Taylor, & Crane, 2003). They provide

efficient storage, easier access, faster retrieval and analysis of data (Fuhr et al. 2007), enabling users to access knowledge anytime and anywhere, through user-friendly interfaces that break the barriers of language, distance and culture. DLs allow copying by downloading documents or printing them (Byamugisha, 2010).

An obvious difference between traditional libraries and DLs is that DLs offer better opportunity for users to deposit as well as use information. Thus, students and teachers can simply be publishers as well as readers in digital libraries systems (Marchionini & Maurer, 1995). Covi and Cragin (2004) emphasize that students and faculty more and more require and prefer access to electronic sources delivery systems and to networked information. This is a clear sign that in order to meet the information needs of the academic community, academic libraries must provide online information services.

DLs not only tender wider access to resources in their collections, but provide for longer protection of the materials (Lopatin, 2006). The strength of DLs and digital collections depends on the relationships libraries develop and maintain with the creators, publishers, and aggregators of Resources, as well as with those who use, learn from, and appraise these resources (Sharifabadi, 2006). Chowdhury et al. (2006) state that DLs have substantial features, such as fast search facilities, which users readily adopt as they can select resources while they browse.

A full-service DL must carry out all the necessary services of traditional libraries and also share the well-known advantages of digital storage, searching and communication (Chowdhury & Chowdhury, 1999). One of the major advantages is that information security in DLs has its foundation in the mature processes that are adopted for other types of information systems. These include regular back-ups, off-site storage of information and an audit list of changes (Chaffey and Wood, 2005), As well as data base transaction logs and redundancy management.

The content and services from DLs have been disparate; as have the techniques they use (Smeaton, & Callan, 2005). There are a number of library software package solutions available in the market. One such software application is the Aurora system, which can be customised and extended to suit particular DL requirements. Aurora is a versatile library operational system that can be used by small to large libraries to support DL functions at low cost with efficient internet connectivity (David, 2000).

Visualization is an important technique for making the interface user-friendly, so the user can understand how to explore and manage the information resources (Wan, 2006). Kogalovsk (2000) explains that the information resources (IR) of DLs consist of information and metadata. The metadata describes features of the collection in detail and the features of its resources as real world entities. According to Kogalovsk (2000), specifying the content of the collection comes in different modes. For instance, a collection can be defined simply as a set of its IRs or as its reference list; for example, URLs of references (Kogalovsk, 2000). According to Marchionini and Maurer (1995), a library is essentially an organized set of resources. These include human services as well as the entire gamut of media (e.g. text, video, and hypermedia).

An alternate method is to implicitly specify the library's contents by a membership criterion. This method is more appropriate for regulating collections based in the universally distributed hypertext internet environment (www). In developing the IR collections for DLs, along with newer methodologies, legacy based database technologies, word processing systems and web servers are also used with respect to all avenues of development, and this results in a mixed but integrated technology for DLs (Kogalovsk, 2000). According to Borgman (1997), multiple languages are important for all DLs accessibility on the internet because of their support role in search and display.

The field of DLs is still in the growth phase, and it is expected that new horizons will emerge with many challenges (Moghaddam & Bayat, 2008). New generation tools will better identify and recover trustworthy and precise information from the growing volumes of digital information (Gbaje, 2007). In the global digital information era, DLs have significantly grown in popularity (Chowdhury, Landoni, & Gibb, 2006). One of the major reasons that DLs have become commonplace is because the internet is increasingly used by communities for diverse purposes, particularly for the important social functions of information sharing and collaboration (Smeaton & Callan, 2005).

In the long run, the DL will be based on platforms that are almost typical in the commercial world. A fundamental issue in the overall design is a concern with compatibility and interoperation with other standards and integrative systems and processes (Chowdhury & Chowdhury, 1999). Covi and Kling (1996) argue that understanding the broader context of technology use is paramount to understanding DL use and its implementation in the social

world. However, as Covi and Kling (1996) have claimed, there are only some high-level theories that assist designers in understanding the repercussion of these issues for DL design and implementation. As suggested by Schiff, Van House, and Butler (1997), the DL research community is more and more concerned about the need to base the design of DLs in the work of the community they support and operate within. Schiff et al. (1997) also mentioned that DLs, currently accessible to a wide range of users for many uses, present a large and diffuse design space, thus challenging any methods of identifying and involving a “representative” range of users and potential uses.

DLs must be designed carefully to reflect the organizational social structures and requirements. To neutralize these problems, DL designers and implementers must first recognize the social framework prior to technology design and development (Crabtree et al., 1997). In addition, there is also a need to increase the awareness of digital resources available and their potential to support specific end users' needs and requirements. Chen and Chen (2010) assert that to augment user interaction with a DL searching, reading, and learning information in a DL must be well organized. Currently, information in DLs is stored as basic units of digital information (e.g. a digitized map, section of text, web page, or scanned photograph). Nevertheless, flexible and efficient organization of information is a key design challenge for any DL.

### **Transitioning to DLs**

Librarians and information professionals are responsible for creating innovative systems for the collection, organization, dissemination and preservation of information and new knowledge regardless of format (Gbaje, 2007). In a conventional library setting, what users want becomes clear and more focused after some discussion with the librarians, but in a DLs context, no such librarian is present and the system itself must effectively providing user guidance (Theng, 2002). With DLs librarians are responsible for preserving and enhancing existing information resources by converting them to the online environment, computerizing existing collections, adding computers for user access, and providing access to online databases and the internet. Librarians must develop new approaches to managing their resources as the dynamic, changing, competitive environment necessitates specialized staff and improved management competences (Moghaddam & Bayat, 2008).

Computers are unquestionably vital as the primary tools with which digital libraries are built, but people are needed to put it all together and make it work (Hastings & Tennant, 1996). Ashoor (2000) argues that the library manager must play a valuable role in implementing DLs. This may require library managers to modify their style of management. It also means that library managers should organize and put into practice plans for innovative staff training, end user instruction, and the development and management of effective information sources. A manager of a DL requires a broad comprehension of IT systems. Managers must provide library staff with the necessary qualifications for tackling hardware and software difficulties, handling technical problems with networks, and other trouble-shooting (Kajberg, 1997).

Nkanu and Okon (2010) state that arising from global trends, librarians are now poised for training and retraining to enable them to be part of the bridging tools in the digital divide. Librarians need to be ready to play a more effective role using the internet, E-mail, CD-ROM, and other peripheral facilities as tools for generating, obtaining, processing, storing, retrieving as well as disseminating information services in libraries. “As a result of such a development, libraries, librarians and managers of DLs are concerned about how the phenomenon of such libraries can be effectively managed so that they can meet the main mission of libraries to society and human cultural and scientific heritage and also use available innovations provide the information life cycle from creation to dissemination with more speed, scope, currency, efficiency, effectiveness, quality and productivity” (Moghaddam & Bayat, 2008).

Based on a meta analysis of previously published papers, Kajberg (1997), lists the necessary skillsets and abilities required for librarians for the modern age:

- computing and networking skillsets
- effective interpersonal communication skills
- Understanding of research based on reasoning and discipline
- knowledge of psychology
- extent of technological sophistication
- ability to understand and communicate librarian roles in the organizations in which they operate
- skills and sensitivity to work effectively with people from diverse cultural backgrounds
- management skillsets such as financial planning and strategic thinking

- using visual aids for effective communication

Additionally, there is a need to provide training for some users, with a supportive and lenient approach (Adams & Blandford, 2001). Ishaq (2001) mentions that without sufficient training, users cannot employ the internet effectively to press forward their objectives. Instead, users may find themselves lost and confused on the web, as a result of information overload, or get caught in the net of pirates, perverts, and impostors. As pointed out by Theng (2002), end users need the services of an information expert to support and inform them.

### **Benefits of DLs**

Adams and Blandford (2002) suggest that DLs are used in many ways and these systems support a whole range of needs across different domains (e.g. academic, clinical, and business). Schiff et al. (1997) support these views and state that DLs, in particular, can change the context of people's work practices and can for that reason restructure and redefine their relationships with each other and with the task in hand. Automation of library systems has distorted service delivery in various ways, including reduction in material processing time and improved interlibrary delivery (Covi & Cragin, 2004). Modern libraries have progressed from paper-based systems into distributed networks of digital and non-digital material, providing state-of-the-art library services along with traditional services (Liu, 2011).

With the improvements in IT and the popularization of network applications, people these days acquire their required information and knowledge mostly through the internet. A DL is an extensive knowledge network system, combining the environment with a community service organization (Meng-Xing, Chun-Xiao, & Yong, 2010). The remarkable developments with regard to IT and especially within the ICT domains are having a substantial effect on all areas of human activity. It has become a day-to-day activity to move between different search engines, information hubs or directories, renowned for providing high quality current full-text scientific information (Van Brakel, & Chisenga, 2003).

DLs offer improved and efficient access to information and facilitate accessing the data from multiple locations. Extensive DLs can be accessed in full from any location or workstation, homes, offices or laboratories, without having to actually travel long distances to physical libraries (Kavulya, 2007). Moreover, DLs safeguard the contents of the owner's information and enhance wider distribution of learning environments (Byamugisha, 2010). According to

Lopez and Larsgard (1998), DLs are flexible institutional frameworks that can adapt to the driving forces of technological change and encourage networked scientific processes, organizational restructuring, and inter-organizational collaboration, which conservative libraries and data centres are not able to do.

Wan (2006) found that by using DLs the limits of space and distance are broken. According to Smeaton and Callan (2005), DLs can simulate a meeting room where users can share ideas, data, documentation and logs with each other. Kolloffel and Kaandorp (2003) assert that one essential benefit of DLs is to provide electronic services that are easier to observe and more focused on resources. According to Kirlidog and Bayir (2007), electronic databases bring several advantages over printed materials. First, most of them allow easy navigation within a text such as revealing the relevant reference or note and thus returning back. Second, several databases allow navigation from one article to another, saving the reader's time accessing the paper version in the library. Third, from the point of view of a library, electronic databases are relatively cheaper than printed material.

There has been an incredible growth in the use of digital public libraries, and customers have benefited from the growth and ease of services, like the ability to carry out online browsing and research from the vicinity of their homes. Consumer are getting accustomed to the increase in digital library services and the ease at which they can access global information that was at one stage difficult to retrieve from traditional physical libraries (Kuzma, 2010). Kavulya (2007) reports that DLs provide a mechanism for faster access and exchange of information in various sectors, such as medicinal studies, government service and business studies, research and scholarship. DLs can easily be shared and therefore are available to everybody around the clock from any location in the world; this offers flexible arrangements for students, scholars, researchers, and the wider community.

With the increase of available materials and user expectations, libraries tend to exploit new technology to fulfil their aim with relatively limited resources (Liu, 2011). Academic and research library users regard e-libraries as better services because the time required to access various materials is reduced, and there is now electronic access to materials not formerly accessible (Covi & Cragin, 2004). DLs invite participation by encouraging library users to participate and contribute to the understanding of resources so that eventually everyone benefits (Robinson, 2008). The DL therefore offers an even more extensive platform by

helping learners develop their abilities to access, evaluate, and utilise information to develop knowledge, to think critically, and to solve problems (Wang, 2003).

Lee et al. (2005) explain that the key advantages of DLs over traditional libraries include:

- DLs bring the information closer to the end users, making it more accessible, and may increase its usage.
- DLs use computer technology for searching and browsing, which is helpful for reference work that involves leaps from one source of information to another.
- In DLs information is always within reach, available at all hours; materials are never checked-out, miss-shelved, or stolen.
- In DLs new forms of information become a possibility.

Accessing the internet allows libraries to retrieve all sorts of information, search the online catalogues of other libraries, share information sources with other organizations and institutes, communicate with book jobbers and vendors, and access a wide range of international databases (Ashoor, 2000). According to Zhou (2005), the unique characteristics of digital libraries include:

- storage facility for information resources
- information resources in varied media
- network broadcast of information resources
- distributed information resources management
- highly shared and pooled information resources
- intelligent retrieval technologies
- information services without the limitation of space and time.

Pacios (2007) explains DLs have taken a pivotal place in facilitating independent, ongoing learning and therefore they are contributing to the personal and social development of people of all ages. They are leading to the development of opportunities and satisfying the community's wish to understand its and other peoples' cultural heritage through literature, history, the arts and poetry. With their materials, resources, technology and activities, DLs are teaching people how to search for and evaluate information and helping people to acquire skills that will allow them to critique constructively.

The introduction of DLs into the education process was made easier by long distance education, which has developed over the years, using the internet and the worldwide web. Distance education programs typically mount sets of materials on web servers to support online courses. One of the critical ideas that have emerged is to join learning materials on various topics, written by different educators, in a digital library of courseware (Sharifabadi, 2006). As rapid technological development occurs students' needs and outlook also go through a change process. Currently, education styles have become of paramount importance in facilitating students to participate actively, communicate in a flexible environment, share information universally, personalize the education environment for themselves, and learn independently regardless of place and time (Mazman & Usluel, 2009).

Marlion et al. (2001) suggest that DLs can work as cognitive tools to support the learning and sense-making activities of individual end users. This view focuses on how people can make use of multimedia resources in DLs to construct their own knowledge representations, and characteristically draws on cognitive theories such as constructivist learning or those taking a human-information processing perspective. DLs are reachable in classrooms and from homes as well as in central library facilities where dedicated access, display, and use tools may be shared. Remote access allows possibilities for explicit field trips, virtual guest speakers, and rare and exclusive materials in classrooms and at home. New pedagogical methods should accompany DLs for education to reach the goals of formal education (Sharifabadi, 2006).

Library systems in developing countries of the world have developed in conjunction with systems in the industrialized world (Hopkinson, 2009). For examples, the higher education sector in the developing countries is experiencing an extraordinary rate of growth. According to Moyo and Cahay (2003), this tendency is a result of new enabling technologies that have facilitated the essential delivery of an academic environment. This has in turn resulted in the globalisation of academic programs, and virtual academic communities; with libraries playing a key role in the success of the virtual academic environment.

Byamugisha (2010) found that one benefit of DLs is the sharing of essential humanitarian information using a non-commercial mechanism. Humanitarian information could be shared by different sectors like education, health and wellbeing, agricultural science, nutrition studies, disaster relief and water supply. Wang (2003) acknowledges that in today's world coherent access to a large, organized depository of digital resources can be provided in a digital library world, without the user being aware of all the underlying intricacy inherent in

mapping its resources and content, and without the need to recognize the separate elements of such knowledge, because all these numerous resources can be flawlessly integrated.

According to Manaf (2007), the world is losing a lot of valuable cultural heritage information due to several factors: natural causes (e.g. cyclones and monsoons), moulds, insects and rodents and acidified paper, on which knowledge is recorded, which eventually is converted to dust and rubbish. Therefore, developing high-quality digital content is a key to improving and enhancing public access to cultural heritage information, along with promoting teaching and research. Manaf (2007) argues digital surrogates can bring together widely scattered research materials across the globe, which will allow viewers to conflate collections and compare items that can be examined side by side exclusively by virtue of digital representation. Thus, the easy access to reference surrogates is an additional advantage to researchers when developing efficient and effective research strategies.

Library collections in general represent the priceless heritage of humanity through facts, ideas, thoughts, accomplishments and evidence of human development from one generation to the next generation. Bankole (2010) contends that the consequences of the loss of such materials are beyond imagination. It is therefore important that librarians and other professionals working in information management or managing these repositories take every step to ensure that their materials are in stable and usable conditions. DLs offer an increasingly important means of preserving such materials for future generations.

### **Limitations and boundaries of DLs**

DLs research has attracted much attention in developed countries (Rusbridge, 1998), and many complexities have been noted about the experience of use and managing access to DLs. According to Rusbridge (1998), the director of the Electronic Libraries (eLib) Programme in the UK, all of the five extensive-library projects that began in January 1998 and were completed in 2000 experienced problems, such as system security, managing user access, designing end user and staff interface, database inter-connectivity, staff training and infrastructure management.

Anandarajan, Igbaria, and Anakwe (2000) discovered a high failure rate of DL implementations in developing countries. DL applications involve cultural issues, as there are differences in the method of information retrieval and type of information retrieved by different categories of users (Borgman, 1997). Worldwide, one of the common barriers to the

use of ICT in the digital age is linked with information literacy. Information literacy is an art that extends from knowing how to use computers and access information to critical reflection on the nature of information itself, its technical infrastructure and its social, culture, and philosophical perspective and impact (Nkanu & Okon, 2010).

Smeaton and Callan (2005) observe that there are some constraints with DLs and that many of these are related to the ability of the user. These include:

- cognitive skills (e.g. learning styles, perceptive abilities)
- individual variance (e.g. education, gender, age, experience)
- behaviour patterns of groups or individuals
- subject field (e.g. health, engineering, arts)
- labour environments (e.g. business, home, office, and university).

Heeks (2002) asserts that incorrect use of digital information systems will increase the void between the systems and the end users. According to Heeks (2002), the factors to be carefully considered for an efficient DL are: method of data storage, hardware infrastructure, software, effect of culture and politics on user access practices, staff training, user expectations and computer skills, digital systems management plan, budget requirement for implementation and maintenance of DLs. Cullen (2001) explains that it is necessary to build more useful long term user models and, to achieve this, new techniques for data collection and analysis need to be developed. According to Borgman (1997), efficient models designed using globally accepted standards should have a provision to make alterations to maintain evolving standards without having to make many sacrifices in the desired features. Therefore, it becomes even more important that the question of standards may have to be answered prior to any significant developments (Masullo & Tsantis, 1995).

Luther (2000) identifies the following potential issues and difficulties of understanding and using electronic resources in libraries:

- not enough information on usage
- lack of marketing methodology
- variation of content
- lack of ease of user interface
- difficulty in building an economically sustainable system
- ensuring user privacy

- no comparable data being available
- difficulty in the correct context.

The digital divide means that some individuals and/or communities can use electronic information and communication tools, such as the internet, to improve the quality of their lives and some cannot (Salinas, 2003). Most of the related studies have taken the information divide and poverty as one of their primary objectives to explain the formation of the information divide and poverty. In concurrence with the theoretical perspective and framework that these studies adopt, causes of information divide and poverty appear to have been sought in three different domains: the political economy domain, the culture domain and the cognition domain (Yu, 2006).

Other variables that contribute to this disparity, all of which must be dealt with if the divide is to be closed, are:

- access to the technology (hardware and software)
- skills to utilise the technology
- appropriate content
- becoming information fluent in today's society (Salinas, 2003).

The ability to use ICT is now assumed by most commentators to be a requirement to living and working in the "information society". It is widely agreed that ICT is transforming all aspects of society from education to civic involvement, employment to leisure (Selwyn, 2003). The development of ICT and omnipresence of computers in universities have brought along with them several changes to the learning and instruction methods as well as the operating environment of libraries (Boumarafi, 2010). A new educational delivery model has evolved from the use of the web technology. Hence, e-learning has emerged as a shared learning process to meet the demands of a new age in which ICT has reshaped and is continuing to reshape the educational environment (Boumarafi, 2010). One of the major requirements of a DL environment is to maintain the originality of information. With the availability of technology, one can use information created by others and can effortlessly claim it as one's own (Rusbridge, 1998).

According to Klecun (2008), dealing with online services rather than face-to-face contact necessitates the learning of ICTs and having at least basic technical skills and an adequate level of basic literacy skills (e.g. reading, writing and, beyond this, understanding sometimes

complex or ambiguous written texts). As a result, existing inequalities including digital inequality will not be eliminated with the introduction of new technologies. In addition, it seems reasonable to assume that there will always be people who do not have access to the internet or other new media. It seems that the issue of non-use is not entirely generational, and thus it will not be solved when all generations have grown up with the technology.

Cullen (2001) observed four potential issues related to the digital divide that appear to be relevant to DLs. They are physical access, lack of ICT skills, attitudinal barriers, and content impact on developing countries. An elaboration follows:

*Physical access:* barriers identified under physical access include the lack of powerful telecommunications infrastructure, the necessary equipment and cost. Cullen (2001) contends that DLs provide access for people with disabilities and that the internet should allow full participation in communication systems for all people in the community.

*Lack of ICT skills:* this has prevented certain groups from using the internet in developing countries skills. In the context of ICT skills, the literature increasingly promotes the need for educators to go beyond teaching IT skills, and emphasises e-literacy (Cushman & Klecun, 2006).

*Attitudinal barriers:* cultural and behavioural attitudes that lack of technology has contributed to lack of skills, such as using computers for older people or those with poor literacy. Other issues include unsecured personal information and unsuitable material on the internet.

*Content:* specific groups in society, such as women and the elderly, are not interested in browsing through websites, because they have a notion that the information available is of little use to them.

### **Implementing DLs in developing countries**

According to Cullen (2001), there are many factors causing the gap between the developed and developing worlds. These include socio-economic, geographical, educational, attitudinal and generational differences. The digital and information revolution offers an historic opportunity for developing countries to move forward, extend their own productive and creative capacities, and become integrated into the global virtual economy. DLs can provide

benefits to developing countries by distributing information about subjects such as education, health, water supply and disaster relief (Byamugisha, 2010).

The advancement of technology is well recognised in the global community, and it can widen the gap further between the developed and developing nations (Cullen, 2001). The internet density is still much higher in industrial countries, as well as in prosperous and educated communities within those countries. Park et al. (2009) explains that recently DLs have been implemented in developing countries through international aid programs such as the humanity development library project, the African Collection for Transition, and the Essential Electronic Agricultural Library (TEEAL). This has been proposed to greatly improve access to knowledge about: science and technology, economics, disaster management and environmental studies; the knowledge that is often found to be lacking in developing countries.

Passos et al. (2008) identify that the scientific and technological development in Brazil took place at the same time as establishment of DLs in various fields of activity and influence. They become a tool for knowledge access, sharing and cooperation, which allowed all the scattered and disorganized information available from the internet to be selected and stored, creating a channel of pertinent information distribution with reasonably good quality.

According to Byamugisha (2010), in Uganda DLs offer fast access to information, good management of information and an enhanced distributed learning environment. Rosenberg (2005) observes that the university environment in Africa has changed dramatically. This change has been brought about by a large investment in electronic infrastructure and attention to e-learning approaches to improve educational excellence and increase accessibility. However, as noted by Kassim & Kochtanek (2003), education for DLs is not an easy proposition. This is because it involves so many layers of technology and simultaneously so much that is new in creation, content, representation, organization, access and use, and in social, legal and cultural issues.

Nkanu and Okon (2010) suggest that many Nigerian libraries are now converting the contents of their print information resources into electronic databases, thus increasing their reliance on technology. Gbaje (2007) affirms that technology has brought about totally different ways of providing library services, resulting in the development of new services. Therefore, the internet is now the predominant mode of information exchange in many libraries in the digital age. It is no longer a luxury but a necessity, which Nigerian libraries must accept and take up

(Nkanu & Okon, 2010). Rosenberg (2005) noted that the development of DLs in Nigeria is ongoing, with many local resources digitised, and there are plans to establish a National Virtual Library.

Libraries in Africa are poorly stocked with the current materials (journals and books). Even where books are available, they are often hard to access due to poor record management systems and practices. Yet many African researchers still depend mostly on conventional information sources, predominantly printed matter, for their research (Ng'etich, 2003). Currently, access to social science publications in Africa has been constrained by a number of factors, including poorly stocked libraries, excessive cost of postal services that makes inter-library lending and sharing of resources unsuccessful and inefficient, and elevated charge of international journals and books together with low funding levels for libraries and universities in general. Other libraries are poor and possess inadequate technology and low technological literacy, in particularly in the information technology area (Ng'etich, 2003).

It has been observed that those African libraries with high levels of library process automation also have excellent ICT facilities, well trained staff, and offer e-Library services. And those with low levels of capabilities have not made the transformation into IT- based functions. Thus acquiring and building a library management system is the essential first step in the implementation of DLs (Rosenberg, 2005).

According to Rhema and Miliszewska (2010), in Libya technologies have had a major impact on curricula, the method of teaching, and learning processes. Lwoga (2012) asserts that the use of ICT has enhanced student enrolment numbers in Tanzania and has thus enabled more qualified applicants to access higher education through open and distance learning. Despite these noteworthy achievements, there is still a lack of research findings on the extent to which Tanzanian universities have integrated these Web 2.0 technologies into their existing curricula.

The Arab countries of the Middle East present an interesting case with regard to digital divide issues. These countries have an undecided status in terms of their “development”, whereas they have reasonably productive and wealthy economies by the benchmarks generally applied to developing countries; they are also in a transitional stage of development in terms of providing technology-enhanced human services, including education and communication. A number of governments in the Middle East region, including the Jordanian government, have taken up the implementation of ICT as an essential instrument of development, and many

countries of the Arab Middle East are making rapid progress in their development status (Obeidat & Genoni, 2010).

In the period of digital era The United Arab Emirates (UAE) has witnessed a classic learning change from a traditional classroom one to a virtual one in which the learners are now actively occupied in their own learning process and pathways. This swing has strongly been backed by open handed investments in the online educational sector and relevant activities because the UAE strongly believes that a vigorous educational system is a passage to the forthcoming web-based society whose trademark is its awareness of significance of the information as a premeditated commodity (Taha, 2004).

Taha (2007) asserts that the use of the Blackboard at UAEU as an instructional tool has become widespread as more students and instructors have incorporated it into their repertoire. These works, however, have ignored the representation of e-library services in Blackboard. E-learning has imposed itself as a new sphere of influence on the e-library services.

Over the last two decades, many academic libraries in the Arabian Gulf region have incorporated electronic resources into their library operations. However, the rate of their progress in shifting from a traditional library environment into an electronic library environment has varied according to the level of education and responsiveness of the library managers, the direction and support of the mother institutions, and the demands for electronic information sources made by their clients (Ashoor, 2000).

To take benefit of the computer and network technologies offered to users and assemble a well-organized electronic library, academic libraries in the Gulf region must restructure their operations and re-define their services. This means carrying out library functions in a totally new way, encompassing new kinds of information resources, new and innovative approaches to acquisition, new approaches to cataloguing, new ways of interaction with clients on electronic systems and electronic information sources, and remarkable changes in intellectual, organizational, and economic practices (Ashoor, 2000).

In Thailand there were efforts in the 1990s to computerize the libraries by purchasing foreign-based systems (Hopkinson, 2009). And in China Yao and Zhao (2009) suggest that the DL construction aims at establishing an integrated and digital science information service environment for end users. For example, the Shanghai Digital Library digitized various types of information materials containing the native collection of treasure like rare books, ancient

books, manuscripts, pictures, photographs, audio-visual materials and so on, to provide specific services.

India for a number of years has been known as a reservoir of knowledge in computer programming. Therefore, it would make much more sense if the library systems were it produced or assembled inside the country. Furthermore, in developing countries there is a need for multi-script systems, which is equalled nowhere- though in Arabic- speaking countries they need, as well as Arabic, Latin and Cyrillic (Hopkinson, 2009). According to Kavitha (2009), In India, university libraries have increased the acquisition of licenses for electronic resources to provide connectivity, to develop library management software, and to organize training.

According to Rhema and Miliszewska (2010), Libya has the highest literacy rate in the Arab world. In addition, the United Nation's Human Development Index, which ranks standard of living, social security, health care and other indicators for development worldwide, places Libya on top of all African countries. Currently, as a part of the Governmental reform plan, there is a move to improve and develop ICT infrastructure in Libya. Libya seeks to develop and modernize the entire educational process. This includes the development of curricula and updating their scientific content. Adoption of ICT in education including higher education is an essential factor in its overall development plan.

da Rosa & Lamas (2012) claim that an important challenge for building digital libraries in Cape Verde and in many other developing countries relates to the availability of the web hosting services. In order to do it effectively on a local scale, it is essential to have an internet connection available with proper bandwidth and static routable internet penetration addresses so that domain names can be properly registered. However, in Cape Verde the cost of such internet connection lines is currently very high. When compared to the price policy that exist in developing countries such as Portugal.

There is a benefit from DLs of better learning through broader, faster, and better information and communication services (Marchionini & Maurer, 1995). However Taha (2007) claims that the provision of the networked e-information services to support e-learning is an area of rising concern to academic libraries around the world. Therefore, the strong capabilities of the e-library in providing e-information services have made the interoperability with the e-learning process a highly urgent requirement.

Park et al. (2009) describe how DLs ensure greater opportunities in accessing and retrieving technology related and science-related information, but note that information is often difficult to access in developing countries. Witten et al. (2001) confirm that despite the great benefits of DLs, developing countries face several challenges when building and using such libraries. da Rosa and Lamas (2012) identify the hindrances as:

- insufficient training of human resources
- low digital and information literacy rates
- poor ICT infrastructure
- small internet penetration rates
- high costs associated with building digital libraries
- decrease in education budget
- lack of funding for libraries and research projects.

The 21<sup>st</sup> century developing countries face various of issues, including widespread poverty, high illiteracy rates, strong foreign debt and challenge of overpopulation and crowding. A common link underlying these challenges is that science and technology could play a pivotal role in their alleviation. In recent years some initiatives have been undertaken in response to the growing appreciation of the importance of improved access to knowledge in developing countries, as well as the growing importance of ICT in enabling this process (Chan & Costa, 2005). Thus, DLs appear to be the source of hope for developing countries by providing access to vital of resources, theoretically from anywhere and anytime, provided that a computer with internet access is available (da Rosa & Lamas, 2012).

There is a benefit from DLs of better learning through broader, faster, and better information and communication services (Marchionini & Maurer, 1995). However Taha (2007) claims that the provision of the networked e-information services to support e-learning is an area of rising concern to academic libraries around the world. Therefore, the strong capabilities of the e-library in providing e-information services have made the interoperability with the e-learning process a highly urgent requirement.

Byrne (2003) found that the obstacles in accessing DL systems in developing countries include a lack of infrastructure, education and skills. Often DLs are available only to organisations that are associated with universities or organisations that are able to afford the substantial cost of implementation and maintenance. It has been found that accessing DLs

requires a certain level of literacy, computer skills, and English knowledge and these might be lacking in some developing countries. There could also be contractual restrictions which might exclude users. He contends that these barriers should be removed to ensure optimal functionality of the system and benefit to the users.

According to Lwoga (2012), the successful implementation of digital technology requires the following improvements:

- Increase the accessibility of computer hardware and software in order to ensure that the users are able to develop their technical skillsets.
- Improve internet connectivity/bandwidth, so it is consistent, fast and users can access it anytime and anywhere.
- Provide technical support for e-learning at a range of scales by recruiting and retraining ICT experts to ensure that they regularly update themselves in the new technologies.
- Ensure the availability of consistent electricity by developing other options in power sources such as solar power.
- Include initial staff training and continuing professional development programmes on e-services to increase awareness and use of e-service software.
- Develop partnership with students to develop approaches to learning and teaching in order to guide the positive aspects of behaviours such as experimentation, cooperation and teamwork, while addressing negative behaviours such as a casual and inadequate critical attitude towards information.
- Seek out shared networks of public-private partnerships to improve e-services activities and programs. These networks can solve problems related to infrastructure to improve bandwidth access, the possibility of having consortia for purchasing bandwidth, as well as strengthening ICT policies, and technical and human capacity building for end users.

The digital revolution in the IT field can close a technology gap by nurturing and supporting human creativity throughout the world. However, for this to happen, the global digital divide needs to be bridged and the internet's potential to serve as a creative playground for children needs to be harnessed (Ishaq, 2001). Therefore, urgent measures are required at the local, national, and international levels to build hardware capacity in developing countries (Ishaq, 2001).

## Conclusion

In summary, the literature indicates that the DL is an efficient means of collecting, storing, organising and distributing information. Whereas DLs can create greater opportunities for learning, implementation in developing countries face many challenges. DLs also require librarians to have specific skills such as ICT skills, communication skills, strategic thinking, and financial planning. DLs offer the advantage of access to information anytime and from anyplace, and can significantly change the method of education delivery. DLs have dramatically changed the academic delivery in countries in Africa, Middle East and India, and have the potential to do the same in other developing countries.

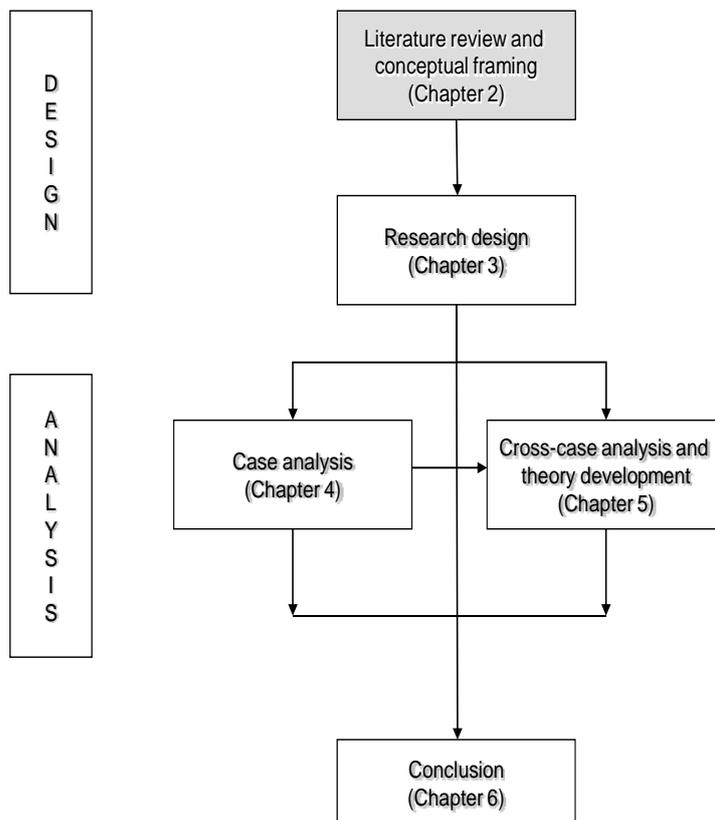


Figure 2. Thesis design - chapter 2

## Chapter Three – Research method

*Having a sound comprehension of the design of research would improve the value of any research study. The research design would condition your rationale and form the basis of the project design. If we see research as not a single object but a process consisting of several factors, we would see that research is an activity that requires many actions. From the time when the topic for research is identified, the researcher would have to go through a well organised intellectual voyage which concludes with the presentation of the results obtained. (Wolf, 1990, p.133)*

In this chapter the researcher addresses the method of the research. She discusses the theoretical backdrop to the study and explains the method selection, data collection protocols, approach to the analysis of data and limitations of the research.

An investigation of DLs represent a truly interdisciplinary research domain because there are many study areas, such as methods for retrieving information, processing data and classification of available material (Wan, 2006). The main purpose of this research was for the researcher to focus on effective implementation of DLs in the developing country of Iraq. The researcher has in general addressed the question of the potential of DLs for Iraq and the inhibitors to their adoption. The specific questions addressed in this thesis are:

- What do Iraq librarians view as the benefits of DLs in Iraq?
- What do Iraq librarians view as the inhibitors of implementing of DLs in Iraq?
- What could facilitate DL adoption in Iraq?

The pre-scientific stage can be approached through induction or deduction. A quantitative approach was considered for this research, but was rejected as the model presumed by survey methodology potentially had several unknown factors, and the model would not correspond to the cultural and economic context (Pare, 2004). Qualitative research is particularly useful when the situation being studied is very broad and complex, or if the situation must be studied within the context of its occurrence (Yin, 2003a). Much of the literature concerning Iraq and developing nations predicted an exploratory study. Yin (2003a) proposes that case study research is particularly well suited to exploratory research and that qualitative case studies can be considered as the most suitable method for addressing the ‘what’ type questions of this study. A case study approach was supported by the ontological and

epistemological stance of the researcher and was therefore recognised as the appropriate approach for the researcher to analyse the phenomenon.

Using a qualitative approach ensured a wider perspective about a limited set of questions. Patton (1990) suggests three kinds of qualitative methods of data collection: open-ended interviews, directly observing the subject, and examining written documentation. As a result researchers can infer a broad and generalised set of findings, which can be presented succinctly and parsimoniously (Patton, 1990).

### Case study approach

A case study is a research approach with the emphasis on gaining an understanding of the different dynamics present within single settings (Eisenhardt, 1989). Case studies are used to gain an in-depth understanding of a person or a situation. In a case study the emphasis is on a single case or few cases, which are studied in their natural setting (Leedy & Ormrod, 2010).

Case study data collection may be conducted by interviews, questionnaires, observations and scanning archives (Eisenhardt, 1989). During the case study a certain person, program or event is studied in detail for a definite period of time. Case studies are useful and well suited for gaining more knowledge of a poorly understood or little-known situation, such as studying the change in an individual or program over a period of time (Leedy & Ormrod, 2010). An interview technique was adopted for this research because it was the only practical method, due to travel limitations that provided the richness of data required for the study. It was envisaged that there would be between four and ten mini-case studies, using semi-structured interviews. The research design is shown in figure 1 below.

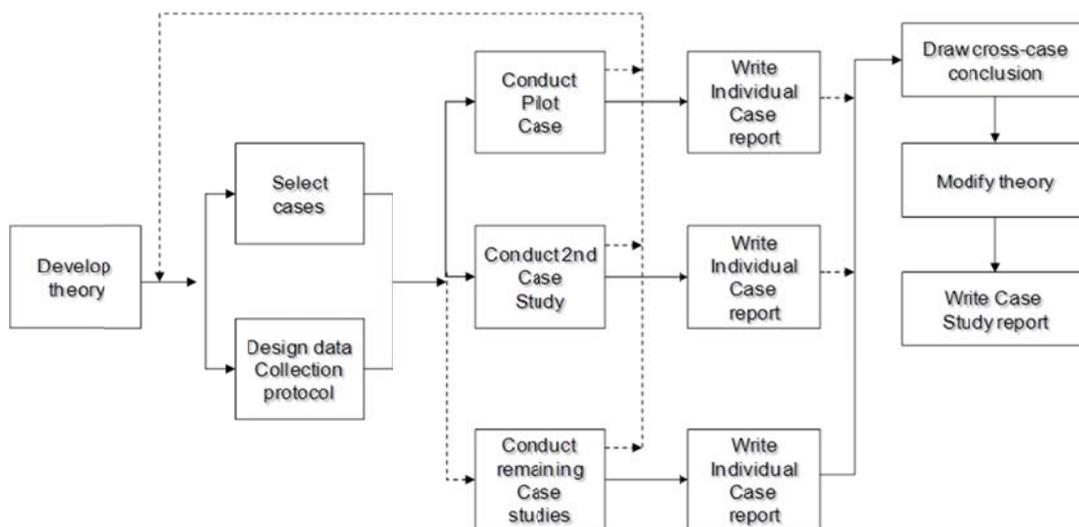


Figure 3. Study method (adapted from Yin, 2003b, p. 50)

## **Selection of cases**

Selection of the cases is a significant factor in the formulation of theory using case studies (Eisenhardt, 1989). Selecting the appropriate case study is an issue of flexibility and selectivity. Flexibility ensures that the issues can be investigated as and when they develop during the collection of data. Selectivity plays an important role in deciding the features that should be covered in the research design stage (Yin, 2003b). According to Leedy and Ormrod (2010), the sample can be chosen either by random selection or through convenient selection. The researcher used the convenient selection method and chose a sample of libraries in different areas of Baghdad. Details of the libraries selected for various case studies are listed in Table 1 below.

In qualitative studies there is no predetermined sample size (Punch, 2002). Case study should generally be finalised at the point of saturation (Pare, 2004). When it comes to case studies used to add to theory, four to ten cases should be considered, because without at least four cases, it would be difficult to generate a credible theory (Eisenhardt, 1989).

Table 1. Iraqi libraries selected in this research

Company identifier	Number of employees	Number of visitors (monthly)	Number of publications	Type of publications	Nature of publications	Type of libraries
Case study 1	4	300	5000	books	religious, history, cultural	public library
Case study 2	5	250	4500	books	art, stories, social	public library
Case study 3	8	2500	16 000	books, theses	textbook, scientific, social, thesis, cultural	university library
Case study 4	5	200	4000	books	fiction, history, social, cultural	public library
Case study 5	7	2100	16 500	books	textbooks, scientific, stories, social, cultural	university library
Case study 6	130	2000	18 000	books, theses	scientific, cultural, history	university library
Case study 7	18	1200	57 000	books	textbook, magazines, books veterinary medicine	university library
Case study 8	8	600	12 000	books, theses	mostly scientific	university library

## Interviews

Interviews typically yield a great deal of information (Leedy & Ormrod, 2010). Moreover, in qualitative studies, the interviews conducted are very different from those conducted in quantitative studies (Leedy & Ormrod, 2010). In qualitative studies, the questions are open-ended or semi structured, centred on a few specific questions. Unstructured interviews tend to be more flexible and are effective in yielding information that the researcher had not planned to ask (Leedy & Ormrod, 2010).

Libraries in Baghdad were selected and individual interviews were conducted with senior library managers and other library personnel. Due to confidentiality and broader concerns the actual number of interviewees and role specifics are not included in this document. Each interview lasted for 30-45 minutes. The interviews were entirely transcribed by the interviewer.

Interview questions were prepared prior to the interviews and were closely related to the research questions and the outcomes of the literature review. The literature review providing the basis of the constructs and melded with the research questions to produce the questionnaire shown in Appendix A. The interview questions are summarised as follows:

- What technology is utilized in the library and what is its purpose?
- What are the advantages and disadvantages of the current method (retrieval, tracking, loss of books, etc.)?
- Do you understand the concept of a DL?
- What do you perceive to be the benefits of a DL?
- Do you believe that a DL system will be implemented in your library? If so when?
- What would inhibit the introduction of a DL system in Iraq?
- What would be needed to facilitate the implementation of a DL?

## **Data analysis**

According to Leedey and Ormrod (2010), there is generally no single “right” way to analyse the data. In the qualitative study design process, the data collection and analysis methods are often reviewed and modified. The initial approach decided for this study was to analyse the data in Arabic. However if the data was not rich enough to facilitate interpretive analysis, it was considered that the data would be translated in English. Once the data was translated it was subjected to content analysis using the Nvivo data indexing tool. Concepts were identified by a systematic process called open coding (Maylor & Blackmon, 2005). Initially the data collected from the interviews was coded based on the research framework and then coded for emerging constructs. The coding process commenced by reading transcribes several time. While reading important themes related to the research questions were identified. There after quotes related to each theme was a category.

## **Limitations**

The potential for a lack of procedural rigour is the major limitation of case study research. In addition, qualitative research is bounded by the ability to generalise findings (Yin, 2003b). The foremost issue for generalization of qualitative research is that it cannot be considered in the same way as quantitative research where a sample is large and more likely to be representative of a wider population (Lee & Baskerville, 2003). The generalization from case study research is referred to as "analytic generalization", signifying that if the same finding is supported by two or more studies then generalisation is plausible (Yin, 2003b).

Theoretical validity consists of validation of the description, validation of the interpretation, validation of the theory, validity of generalisation, and validation of evaluation (Maxwell, 1992). Validation of description involves the transcription of the interviews, and the verification of the data presented, and thus assuring the factual accuracy of the case study research. In general, the validation of the interpretation involves the recording of the participant's perspective, and is ensured by going through the transcripts of the interview many times.

The following are the specific limitations of this study:

- The researcher was unable to personally travel to Iraq, and had to rely on others to conduct the interviews on her behalf.
- There were access difficulties because of the prevailing law and order situation in Iraq. Travel from one location to another and from one state to another was fraught with risk, and as a result, all interviews had to be conducted in the capital city of Baghdad.
- Many libraries were damaged or looted during the last war and had to be closed. The researcher therefore had few sources available.

## **Conclusion**

In summary, a qualitative case study methodology was employed. Eight cases, in different areas of Baghdad, were chosen and semi-structured interviews were conducted at each library. An inductive method of data analysis was employed. The possible boundaries of the research method have been elucidated.

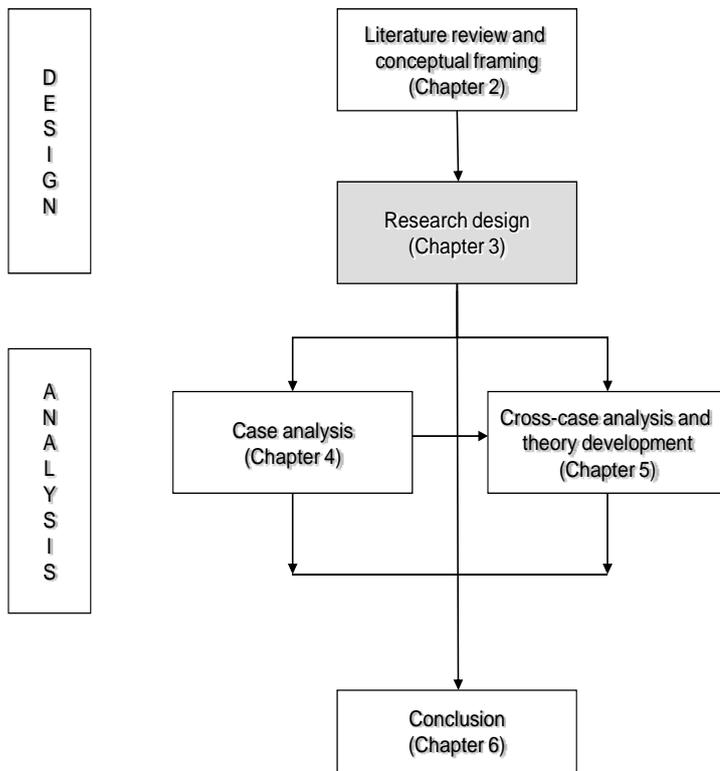


Figure 4. Thesis design - chapter 3

## **Chapter Four – Descriptive case analysis**

### **Presentation of data, results and discussion**

*The primary objective of the descriptive case analysis is to make a detailed in-depth assessment of the sample, in line with the expression of a descriptive theory. The theory thus described must be within the range and scope of the subject being researched, and must be described using sound proposals and queries. If it is not possible to develop a descriptive theory before studying the case, then the researcher should examine if the research is more likely to be investigative in nature. (Mills, Durepos, & Wiebe, 2010, p.2)*

In this chapter the researcher presents the data from the eight case studies. Each case study is individually delineated and the data presented within the constructs identified in the literature review and used as the basis for interviews.

#### **Case study 1: Al-Ahrar Library**

##### **Location and background**

Al-Ahrar Library a public library is located at Al-Mutanabi Street in the centre of the Baghdad city. It has a total of 4 employees and accommodates approximately 5000 publications. Most of these publications are in the form of books. The subject matter of the collection varies but in general it relates to history, religion and culture aspects. Approximately 300 people access the library each month.

The staff interviewed at Al-Ahrar Library all use the one computer for electronic archiving of publications. The software has been in place for 5 years and is regularly upgraded. Users see the advantage of the system as an efficient application that does not take much effort to maintain. Its key disadvantage is that it cannot process book transactions

The staff at Al-Ahrar Library explained that they were aware of the concept of DLs. and conceptualizes a DL as e-books accessed using the internet. However, none of the staff had experience in the actual use of DLs.

##### **Benefits perceived**

It was explained that the main benefit perceived by the Al-Ahrar Librarian in pursuing a DL system was the preservation of books from disasters such as wars and floods. The interviewee was mindful that many valuable books were lost through the destruction of library buildings

or from looting during the recent war. Also she saw the provision of efficient and faster electronic services to clients and improvement in community education as benefits. The Senior Manager advocated DLs due to the perceived ease of use and speed of accessing information. Additionally, one interviewee stated that *“the general benefits of DLs amounted to reduced time and effort to search and retrieve information”*.

### **Inhibitors for Adoption of DL**

An Al-Ahrar Library Senior Manager explained that there are many factors with a potential to inhibit the adoption of a DL System at Al-Ahrar Library. These include the librarians' low level of English Literacy, lack of support for DL projects, electricity load-shedding and thus intermittent supply of power, and lack of ICTs due to low levels of computing and technological skills. In response to a question on the resistance for adoption of the new ICT, the Al-Ahrar Library Senior Manager stated *“There is a high level of poverty across Iraq. The poverty leads to low literacy rate and therefore high level of resistance in adopting the Internet as a new technology”*.

### **Implementation of DL**

Whereas many benefits of DLs were recognised, it was proposed that the Al-Ahrar Library would not be able to implement such a system for a variety of reasons. As follows:

*Iraq suffers from a lack of robust telecommunication infrastructure, with insufficient reliable bandwidth for internet connections, making the successful operation of the DL system difficult. The library is having financial problems and cannot afford the high cost needed to purchase the necessary equipment to go along with a DL system.*

*Our library staffs do not have sufficient knowledge and skills to reliably operate such a system.*

The Al-Ahrar Library Senior Manager added that a DL System could be implemented, if the Al-Ahrar Library had access to funds to train library staff in the effective use of IT and could improve the IT infrastructure. It was also recognized that provision of computers for public use at remote sites, such as internet cafes, is an important first step in the successful implementation of a DL System.

### **Resources needed for Adoption of DL**

According to the Al-Ahrar Library Senior Manager, Al-Ahrar Library would be able to implement DL subject to the provision of appropriate resources and an overall improvement in the learning environment at the national level. He added that *Literacy rate of the Iraqi community needs to improve because a well-educated and informed community can make better decisions and choices about the adoption of modern technology.*

In his view, the Iraqi Government should encourage the use of DL by school students. Similarly, access to stable power supply and stable finances, with a lump sum amount of AUD\$120,000 are essential for the implementation of DL System at Al-Ahrar Library. The Al-Ahrar Library Senior Manager regards the Ministry of Culture in Iraq as a possible funding source.

## **Case study 2: Al-Safeer Library**

### **Location and background**

Al-Safeer Library a public library is located in the centre of the Baghdad city at Al-Tahrir Square. With a total of 5 employees, the library has 4500 publications-mostly in the form of books, which range from art to social topics and fiction. Approximately 250 people access the library monthly and are reasonably satisfied with the library services. Retrieval of the books is the main issue facing the library.

Al-Safeer Library uses one computer for electronic archiving of the publication material. The software used by the library is 5 years old and is regularly updated as new versions become available. The library has a manual system in the form of old indexing cards. The advantage of the existing system is the ease of use with minimum efforts. Its key disadvantage is that it cannot be easily modified and expanded.

In spite of lack of direct experience, Al-Safeer Library staffs are aware of the DL systems. They conceptualize a DL as electronic books saved on an electronic server accessible by users using the internet.

### **Benefits perceived**

The Al-Safeer Library Senior Manager perceived several advantages of a digital library. He said:

*It is easy to manage and deal with DLs. Using such a system; we can provide library services to customers located in remote areas of Iraq. DLs provide a fast method of*

*accessing and exchanging information in all sectors of knowledge. Digital information can easily be shared and thus is available to everybody.*

Furthermore, the Al-Safeer Library Senior Manager explained “*The general benefits of DLs include the need for fewer employees to run the library services and the likelihood for cost saving*”.

### **Inhibitors for Adoption of DL**

The inhibitory factors in the adoption of the DL System at Al-Safeer Library were thought to be multi-faceted. According to an Al-Safeer Senior Manager “*We have a weak regulatory system in Iraq and most of our laws and regulations are outdated. Our education system has been degraded due to several years of wars. The war has destroyed much of the country’s telecommunication infrastructure such as servers, networks and access to a reliable internet. On top of that, our staff members do not have adequate knowledge and skills needed to adopt DL systems*”. He went on to say that electricity load-shedding and thus intermittent supply of power is the key infrastructure inhibitor, and the lack of e-book readers is seen as main society inhibitor.

### **Implementation of DL**

Despite believing in the tangible and intangible benefits of DL, the Senior Manager thought Al-Safeer Library would not be able to implement the system due to these reasons:

*Illiteracy institutes a real problem that acts as a barrier to any development processes. Iraq has undergone a long period of wars which affected our education system and so illiteracy rates in the country are very high. The lack of capital and infrastructure make it difficult to implement digital library systems. Our library has a big challenge to face as we do not have the skilled staff needed to implement such a system.*

### **Resources needed for Adoption of DL**

Al-Safeer Library Senior Manager believes that they would be able to implement the DL system if the following were addressed:

*First Iraq must overcome the electricity shortage and uninterrupted power supply needs to be restored. Improvement in the basic knowledge of users on computers and on how to use software would certainly be needed. High speed telecommunication*

*networks are also required. And our library staff would need professional training in using DL system.*

An estimated amount of AUD\$120,000 would be required to implement a DL at Al-Safeer Library. The staff thought this funding could come from Academic Bodies and the Ministry of Culture in Iraq. It was also recognized that the success rate of the implementation of DL in Iraqi libraries would be increased by raising the importance of this subject to the primary school students.

### **Case study 3: College of Administration & Economics Library-Baghdad University**

#### **Location and background**

The College of Administration and Economics Library an academic library is located in the north of the Baghdad city is a large public entity. It has eight employees and about 2500 people access the library each month. It has 16, 000 books and theses. The subject matter of these publications varies in range and includes material on science, social and cultural issues.

The College of Administration and Economics Library has two computers and both are used in the electronic archiving of the material. The software is 10 years old and is regularly updated by technical staff. The College of Administration and Economics Library also operates a manual system in the form of traditional registers. The advantage of the current practice includes effort and time saving in searching and finding information. The key disadvantage is that it needs a trained staff member to work on it.

#### **Benefits perceived**

The College of Administration and Economics Library staff members are aware of the availability of DL Systems. They have no formal experience in using DLs and conceptualize the digital libraries as e-books organized and saved electronically within an internet space.

The College of Administration and Economics Library staff perceives the following benefits of implementing a DL:

*DL's make it possible to do unified search across material of varying formats such as full text, dynamic references and citation linking. DLs lead to wider access to collection and enhanced operations by sharing resources. DLs can be timely and*

*relevant to specific needs of the users. DLs can provide useful content for teaching and researching by:*

- 1. Putting local information into virtual databases*
- 2. Digitizing research reports, theses, papers, dissertations and government documents produced in the continent*
- 3. Time saving for students and researchers, rather than to look for information through hard bound catalogues.*

Moreover, the College of Administration and Economics Library staff asserted that “*The general benefits of DLs comprise saving space, time and efforts of students and researchers*”.

### **Inhibitors for adoption of DL**

The key inhibitors perceived by the staff for the implementation of DL System at College of Administration and Economics Library are many. The lack of infrastructure (the availability of computers and free Internet libraries) and, in particular, an intermittent supply of electricity is considered to be a major inhibitor. There are no information service policies and no legislation on matters such as Intellectual Property Rights. There is a lack of incentives in developing viable library systems and information exchanges at the national level. In addition, the low literacy rate of the Iraqi community is another barrier to any development process. The staff of the College of Administration and Economics Library perceive funding issues (such as lack of local or foreign investments) and in particular the low income of libraries as significant inhibitors for the implementation of DLs.

### **Implementation of DL**

According to the College of Administration and Economics Library Staff, it would be problematic to implement DLs at its Library for a variety of reasons such as lack of the ICT facilities, lack of managing Resources and e-services, lack of secure networks, lack of trained staff, and lack of finances.

It was also recognized that for the successful implementation of a DL System, the College of Administration and Economics Library would need significant investment in improving the knowledge and skills set and training of the library staff. Management also believes that to implement DLs they would have to improve hardware and software usage skills, web design,

and internet searching and evaluation procedures for the electronic information databases. Provision of high-speed telecommunication networks is also seen as a key requirement.

### **Resources needed for adoption of DLs**

In order to implement a DL initiative, the College of Administration and Economics Library would need access to a continuous power supply, adequate infrastructure, trained staff, and better educated society to use these facilities.

The College of Administration and Economics Library estimates that a total of AUD \$150,000 would be needed to implement a DL system and thought the potential sources of funding are Academia and NGOs.

### **Case study 4: AL-Taqadum Library**

#### **Location and Background**

Al-Taqadum Library a public library is located at Al-Mutanabi Street in the west of the Baghdad city. With a total of 5 employees, it holds 4,000 publications. These publications are mostly in the form of books on a range of topics such as history, fictions, and social and cultural issues. On average 200 people visit the library each month and are quite satisfied with the services offered.

Al-Taqadum Library has one computer, which is used for electronic archiving of the material held. Similar to Al-Ahrar Library, Al-Taqadum library faces the issue of loss of books. The software used by Al-Taqadum Library is 5 years old and is updated on an on-need basis. The library does not have any manual systems. The current system of electronic archiving allows for swift searching and finding of information for library users the main disadvantage is that it is time-consuming and manpower is needed to search for information.

The staff of Al-Taqadum Library do not have any direct experience in the use of DL system. However, they are aware of the concept of the DL system and regard a DL as a website containing well organized electronic books.

#### **Benefits perceived**

The library manager considers the following to be the benefits of DLs:

*DLs can be widespread and accessed as full text from any location or workstation. They are available 24 hours a day. They offer flexible arrangements for student, researchers and the community at large. In the presence of DLs, there could be a*

*need for fewer employees and greater access for students, researchers and community. DLs can assist learners to gain access to unlimited set of information from global databases.*

Al-Taqadum Library manager explained the general benefit perceived by a DL is its ability to facilitate the ease of information reach.

### **Inhibitors for Adoption of DL**

Currently the Al-Taqadum library manager sees the following as obstacles in the successful implementation of DL system at their premises.

*Laws and regulations applicable to the Intellectual Property Rights do not exist in Iraq. Staff of the Al-Taqadum Library is untrained and lack necessary skills to operate a DL System. Lack of stable finances is another important obstacle, which makes the purchase of the necessary equipment almost impossible. There is a negative cultural attitude towards the technology in Iraq. The Iraqi community perceives the computers unsafe for children due to the amount of unsuitable material on the internet. Due to ongoing wars, the education system has suffered greatly and this also impacted on the computer literacy rate. Most of the Iraqi population is currently computer illiterate.*

Al-Taqadum Library representative sees the interrupted supply of electricity, lack of funding, and low level of computer literacy in Iraq as the major inhibitors.

### **Implementation of DL**

The Senior Manager of Al-Taqadum Library believes that a DL can be implemented at the library subject to a satisfactory level of progress in the establishment of clear policies for intellectual property rights and nation-wide improvement in the English literacy skills. It was also thought that improvement in basic IT skills of the Iraqi community and, in particular the users of library services are important in the implementation of a DL System at Al-Taqadum Library

In order to implement a DL System, Al-Taqadum librarians need to be well informed on the use of modern information and communication technology. They also need to provide the relevant training to enable staff to establish the DL system

## **Resources needed for Adoption of DL**

Successful implementation of the DLs at Al-Taqadum Library would need support from the Iraqi Government and allocation of a specific room with computers and servers. An estimated amount of AUD \$100,000 would be needed to install a DL System and this funding could come from Ministry of Education and Ministry of Culture in Iraq.

## **Case study 5: Technical Administration Institute Library**

### **Location and Background**

The Technical Administration Institute Library an academic library is located in the south east part of Baghdad city has 7 employees. A total of 2100 people access the library each month and are reasonably satisfied with the level of services. Publications are mostly in the form of books and are 16,500 in total. The range of books includes textbooks, scientific, fiction, and non-fiction about social and cultural aspects.

The Technical Administration Institute Library currently uses electronic archives for the library material. Software used by the Technical Administration Institute Library is more than 10 years old and maintained and updated by the specialist staff in the library. The library has manual systems comprised of information cards organized alphabetically. The current system helps in fast tracking of the information search. The downside is that it involves manual processing, which can be laborious and inefficient at times.

Staff of the Technical Administration Institute Library understand the concept of a digital library but have no practical experience in using one. They conceptualise DL as having electronic books on the website of a library.

### **Benefits perceived**

The Manager of the Technical Administration Institute Library perceives a number of benefits associated with DLs. For example, DLs can improve education such as e-learning, which can enable students to get access to information and to publish information online. DLs can also assist learners to develop the ability to access and to build new knowledge. DLs can encourage mutual understanding and the realization of shared values and aspirations among people of different backgrounds and ethnic origins. Information is readily available and can be accessed from home, offices or any remote location. This in turn saves library users time because they have no need to travel long distances to physical libraries.

Additionally, the interviewee explained that “*DLs can enhance the quality of education and make it more accessible by a viable information storing system*” as the general benefits of DLs.

### **Inhibitors for Adoption of DL**

During the interview, the Manager stated that the Technical Administration Institute Library is not capable of archiving digital collections due to funding and infrastructure problems. There is a lack of physical telecommunication infrastructure and a lack of ICT skills training.

Major inhibitors are frequent power blackouts, lack of Government support at the national level and lack of public interest in reading electronic books. If Government can solve power supply issues, it would be a positive step towards the implementation of a DL System.

### **Implementation of DL**

The Technical Administration Institute Library manager believes that DLs cannot be implemented because there is no telecommunication network infrastructure and requisite hardware and software. There are no established services to access reliable information in Iraq. Staff of the library is untrained and, due to funding constraints, managers cannot invest in their professional development and training programs. The Manager further reiterated that lack of sufficient number of computers and Resources are also major impediments to the implementation of a DL System at Technical Administration Institute Library.

It was explained by the Manager that in order to implement DLs System, the Technical Administration Institute Library would need to automate their operations, provide quality electronic services, and install modern IT equipment at their premises. In addition, they would need to establish a system of data capture preservation and archiving. There is also a need to train all teachers and students in the effective use of IT.

### **Resources needed for adoption of DL**

In terms of infrastructure needs, an efficient network server would be needed. An estimated cost of AUD \$130,000 would be required to implement a DL system and this funding could likely come from Universities and other academic institutions. Raising awareness about the benefits of DLs would be a significant step in educating the public of Iraq.

## **Case study 6: Central Library of the University of Mustansiriya**

### **Location and background**

The Central Library of the University of Mustansiriya an academic library is located in the east of Baghdad city. It is administratively a large library, with a total of 130 employees, and it accommodates approximately 18, 000 publications. Most of these publications are in the form of books and theses. The subject matter varies but in general it relates to history, and scientific and cultural aspects. Approximately 2000 people access the library each month.

The staffs at Central Library of the University of Mustansiriya use one computer for electronic archiving of publications. The software has been in place for more than 10 years and is upgraded by specialist and technical staff. The library also owns a manual system of archiving and this comprises alphabetical cards. Users see the advantage of the system as being capable of fast retrieval and ease of editing information. Its key disadvantage is that it is time consuming and a fair amount of manpower is required to run the system.

Staff explained that they are aware of the concept of DLs. Staff conceptualizes digital libraries as “*set of services that support access to and use of information in digital format*”. Staffs do not have experience in the use of DLs.

### **Benefits perceived**

The interviewee at Central Library of the University of Mustansiriya explained many benefits in pursuing a DL system, in the following way:

*Information can be shared by multiple users. Users can access the library from anywhere all year around. They do not necessarily have to physically visit the library. There is an option of meta-searching so users can easily search the entire collections. DLs facilitate the preservation of special and rare information.*

*Additionally, the interviewee stated DL systems are useful for preservation of books and information. In war-torn countries like Iraq, DLs serve to preserve the great depth of knowledge.*

### **Inhibitors for adoption of DL**

The interviewee at the University of Mustansiriya Library explained that there are many factors inhibiting the adoption of the DL System. These include a library budget that is not even enough to maintain the basic services, the low level of literacy in Iraq, lack of financial

support, the lack of ICTs infrastructure, and lack of trained staff to smoothly run DL systems. When asked about specific infrastructure, funding and society inhibitors, the interviewee responded

*Iraq does not have continuous power supply and thus necessary infrastructure to operate DL is lacking. There is a low level of support for DL initiative projects, but this support is not enough to make it a priority. We have a low standard of living in Iraq and that also inhibits the adoption of modern technology.*

### **Implementation of DL**

Whilst the interviewee recognised benefits of DLs, the University of Mustansiriya Library would not be able to implement a system for a variety of reasons, as follows:

*Iraq lacks sustainable economic growth. Most of the Iraqis do not have basic knowledge on computers and associated software. We do not have high speed networks to successfully operate a DL system. Our Library staffs do not have sufficient knowledge and skills to reliably operate such a system.*

The University of Mustansiriya Library's interviewee added: "A DL System could be implemented, if the educational level and basic standard of living of the Iraqi community could be improved. Then an educational society would be able to make more informed technological decisions"

### **Resources needed for adoption of DL**

According to the interviewee, the University of Mustansiriya Library would be able to implement DL subject to the provision of appropriate resources and an overall improvement in the literacy rate at the national level. The interviewee explained that "Access to stable power supply and stable finances, with a lump sum amount of AUD\$200,000, are essential for the implementation of DL. We need to find sponsors and explore other options such as donations".

## **Case study 7: College of Veterinary Medicine Library**

### **Location and Background**

The College of Veterinary Medicine Library an academic library is located in the north of the Baghdad. With a total of 18 employees, the library contains approximately 57, 000 publications. Most of these publications are in the form of text books and magazines on veterinary medicine. Around 1, 200 people access the library each month.

Staff interviewed at the College of Veterinary Medicine Library said they use one computer for electronic archiving of books and magazines. The software has been in place for more than 10 years and is maintained by technical staff. The library also uses a manual system of archiving and this comprises catalogue cards. Users see the advantage of the current system as being capable of fast tracking, retrieval and less loss of books. Its disadvantage is that it is time consuming and man-power dependent.

Staff explained that they are aware of the concept of DLs and conceptualise digital libraries as “*E-books or e-learning via the internet*”. Staff at the College of Veterinary Medicine Library do not have practical experience in the use of DLs.

### **Benefits perceived**

An interviewee at the College of Veterinary Medicine Library believes that there are several benefits in pursuing a DL system. The interviewee expanded on the perceived benefits in the following manner:

*Users can obtain access to the information at anytime and anywhere. Library Resources can be shared by several users at the same time. A DL system requires little physical space and the system can store a lot more information. It can increase the ability of students to manage their learning. It provides easy access to information that in turn enhances the depth of knowledge. Users can save a lot of time in searching for information. It saves cost because we can spend less for maintenance of existing books and purchase of new books. Users do not need to visit a library building because a digital library is already on their desktop.*

On the question of any general benefits of DLs, the Interviewee responded “*DL systems make the task of locating the relevant information or books much easier*”.

## **Inhibitors for Adoption of DL**

On the question of inhibitors to the adoption of a DL System, the interviewee responded

*We do not have funds to develop the capability of our staff to use DL systems. Staffs lack necessary skills in the use of software, internet searching and an evaluation of electronic information. We do not have high-speed networks in Iraq. We have outdated communication technology and are not advanced enough to adopt modern and the latest e-learning technology.*

When asked about specific infrastructure, funding and society inhibitors, the interviewee explained “*We have internet connection issues in Iraq. There is no financial support for DL at national levels. Our library staff do not have the necessary skills to establish digital libraries*”.

## **Implementation of DL**

The interviewee believes that a DL system would not be implemented at the College of Veterinary Medicine Library for a range of reasons. As follows:

*Iraq has a low rate of IT Literacy. We have frequent power supply failures in Iraq resulting in internet connection issues. Most of the Iraqis have very basic Computer skills. In addition, our library staff is not qualified enough to operate a DL system. The establishment of a DL system would require substantial investment to improve the knowledge and skill base of the staff.*

## **Resources needed for Adoption of DL**

According to the interviewee, the College of Veterinary Medicine Library would be able to implement a DL subject to the provision of relevant resources. Interviewee explained that “*Access to ongoing power supply and a lump sum amount of AUD\$150,000 are essential for the implementation of a DL. We would need to find sponsors and academic bodies willing to support such an undertaking in the absence of government funding*”.

## **Case study 8: Technical College of Management Library**

### **Location and background**

The Technical College of Management Library an academic library is located in east Baghdad. With a total of 8 employees, the library holds around 12, 000 publications. Most of

these publications are in the form of books and theses on scientific topics. Around 600 people access the library each month.

Staff interviewed at the Technical College of Management Library use one computer for electronic archiving of its publications. The software is more than 10 years old and is maintained by technical staff. The library also has a manual system for archiving in the form of catalogue cards. Library staff sees the current system as being faster and well-organised in the processing of information.

The staff member explained that they understand the concept of DLs and conceptualise digital libraries as: “It is distributed services that enable users to access and use information supplied by the digital technology”. Staff at the College of Veterinary Medicine Library does not have any experience in using a digital library. 0.

### **Benefits perceived**

The interviewee at the Technical College of Management Library perceives many benefits in pursuing a DL system, explaining:

*DLs help in sharing information and ideas. It is easy to process information and re-organise information using such a system. Users can have access to information even in remote and rural areas. DLs make the task of locating information much easier. All the accessed documents can be saved, so back-up is always available.*

On the question of general benefits of DLs, the interviewee replied “*DL systems make it easier to search and transmit information*”.

### **Inhibitors for adoption of DL**

On the question of inhibitors to the adoption of a DL System, the Interviewee replied:

*We do not have enough funds to train our staff to use DL systems. Staff lack the necessary skills in the use of computer software and relevant programs. We have frequent power disruptions and resulting internet connection issues in Iraq. At the national level, the Iraqi community does not have an interest in reading e-books”.*

### **Implementation of DL**

The interviewee believes that a DL system would not be implemented at the Technical College of Management Library for a number of reasons, as mentioned below:

*Iraq has an old system of communication technology currently used in all sectors of the economy. We have poor quality network bandwidth and slow internet speeds. As a nation, there is resistance to adopt modern technology. Most of the Iraqis have very basic computer and English reading skills. In addition, our library staff is not qualified enough to operate a DL system. Iraq is a war-torn country and undergoing financial issues, which makes it difficult to invest in modern technology such as a digital library.*

### **Resources needed for adoption of DL**

According to the interviewee, the Technical College of Management Library may be able to implement a DL subject to the provision of resources, as follows:

*Access to uninterrupted power supply, computers and improved internet connectivity are required to operate a DL system on a reliable basis. We need skilled staff to operate, maintain and update digital libraries. A lump sum amount of AUD\$120, 000 would be required to carry out this system. This funding could come from government or private sources such as community organisations. Changes at the societal level are also required to nourish a digital environment and encourage people to use it. This also needs investment in the training of users.*

### **Conclusion**

The characteristics of the eight case study libraries in Iraq have been collated based on the interviews with the management of each library. The main conclusions drawn from this work are:

- 1 The library staff for all the studied libraries is aware of the concept of Digital Libraries, but none of them has practical experience in the actual use of DLs.
- 2 Staff conceptualizes DL as e-books accessed using the internet
- 3 The provision of efficient and faster electronic services to clients, especially in remote areas, and improvement in community education is one of the several benefits of DLs perceived by the Interviewees.
- 4 Despite recognising several benefits of the DLs, none of the Libraries would be able to implement a DL system, for a range of reasons.

- 5 Evidence from the eight case studies suggests that there are no quick solutions to the implementation of DLs in Iraq. This study has found that there are several barriers to implementation of a DL, such as lack of regulatory systems with respect to Intellectual Property Rights, lack of internet servers, lack of knowledge and skills, lack of finance, poor power supply, insufficient skills of users and lack of information infrastructure etc.
- 6 Evidence suggests that the libraries would be able to implement DLs subject to the provision of appropriate resources and an overall improvement in the learning environment in Iraq. The ability of implementing a DL includes increasing the literacy rate of Iraqi community and increasing their awareness about the adoption of the modern communication technology.
- 7 In terms of resources required to implement DLs, there was commonality on items such as access to stable power supply and sustainable sources of funding. The perceived *sum required for the implementation ranged between AUD\$100,000 and AUD\$200,000.*

An institution may have a clear vision and goal to execute an e-learning program, but lack of finances will pose a potential threat to the actualization of that utopia. This issue of lack of resources, especially in terms of finances is a threat to the implementation and support of e-learning programs (Eke, 2010) this appears to be particularly true in developing countries such as Iraq.

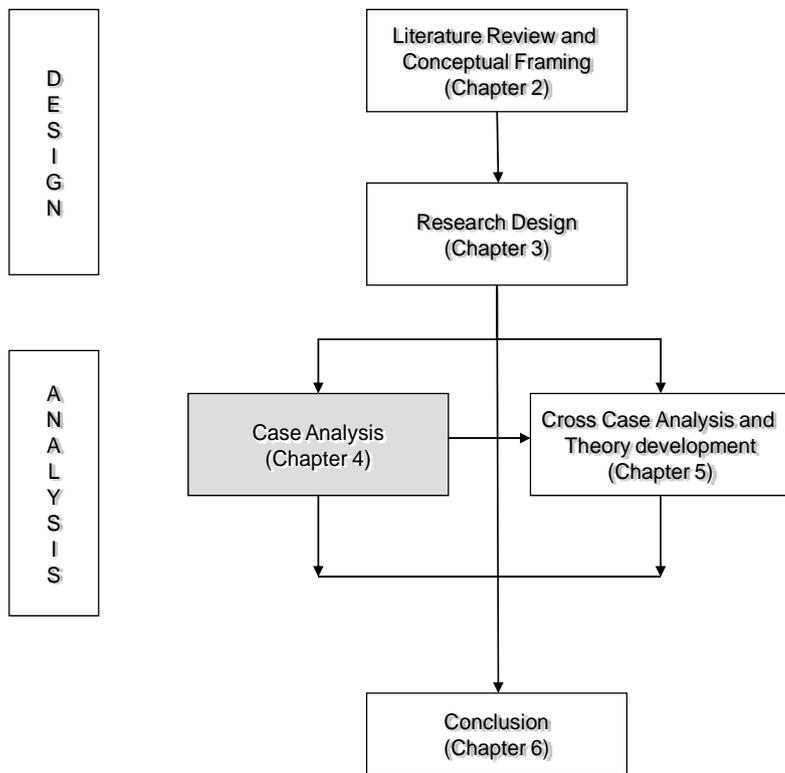


Figure 5. Thesis design – chapter 4

## Chapter 5 – Cross case analysis

*Robust case studies are characterised by stimulating and ground-breaking theoretical background, which are able to overcome tests of excellence and supported by solid evidence. More research leads from theoretical background to data, but still the growth of knowledge is a continuous cycle between information and practice. (Eisenhardt, 189, p.549)*

In this chapter the researcher analyses the responses from senior people in the eight libraries. The perceived benefits of digital libraries are examined and the challenges associated with their implementation described. Further, there is a discussion on the practical aspects of going about building a digital library.

Table 2. Case Studies

Case Studies									
		Al-AHRAR	Al-SAFEER	College of Administration & Economics	Al-Taqadum	Technical Administration Institute	Central Library of the University of Mustansirya	College of Veterinary Medicine	Technical College of Management
Constructs	Perceived benefits	Wider access to information - Reduces cost	Wider access to information - Faster access to information - Sharing of information made easier	Wider access to information - Allows unified search across range of material - Benefits researchers and students - Saves time	Wider access to information - Available 24/7 - Fewer employees required	Wider access to information - Available 24/7 - Improvement in e-learning - Supports knowledge generation	Wider access to information - Information exchange and sharing by multiple users - Option of meta-searching available - Preserves special and rare information especially in the war-torn countries such as Iraq	Wider access to information - Available 24/7 - Faster access to information - Less physical space required for storage of information - Saves cost and time	Information exchange and sharing - Access to information in remote areas - Location information easier - Automatic back-up available for all the saved documents and reports etc
	Inhibitors for Adoption	Poor English literacy - Disruption of electricity	Poor literacy rate - Disruption of electricity supply -	Disruption of electricity supply - Lack of infrastructure	Low computer literacy - No legislation on IP rights -	Disruption of electricity supply - Lack of ICT skills, lack of physical	Poor literacy rate - Low library budget - Lack of financial	No training budget for the Library staff - Lack of high-speed networks	Disruption of electricity supply - No training

		supply - Lack of ICTs infrastructure	Lack of e-book readers	- No information services policies - No legislation on IP Rights - Low income of Library	untrained Library staff - No stable finances - Negative cultural attitude towards technology	telecommunication network - Lack of government support	support - Lack of ICTs infrastructure - Lack of trained staff	- Out-dated communication technology	budget for the library staff - Poor internet connection, no culture of reading e-books
	Implementation of DL	Implementation difficult due to: Insufficient reliable bandwidth for internet connection - Lack of trained library staff - Financial constraints	Implementation difficult due to: low literacy rate - Lack of capital and infrastructure - Lack of trained staff	Implementation problematic due to: lack of ICT facilities - Lack of secure networks - Lack of trained library staff and ongoing finances - Lack of high-speed telecommunication networks	Implementation difficult and subject to: Improvement in English literacy skills - Development of clear policies on intellectual property rights - Improvement in basic IT skills - Staff training needed	Implementation difficult due to: Lack of telecommunication network infrastructure - Lack of requisite hardware and software - Lack of trained staff - Funding constraints - Not enough computers	Implementation almost impossible due to low computer literacy - Lack of high speed telecommunication networks - Lack of trained library staff	Implementation difficult due to low rate of IT literacy - Disruption of electricity supply - Internet connection issues - Unqualified Library staff	Implementation problematic due to very low computer and English literacy skills - Old system of communication technology - Poor quality network bandwidth - slow internet speeds - Resistance to

									adopt modern technology - Unqualified library staff
	Resources Required	Literacy rate needs improvement - Stable electricity supply and on-going financial support required - Capital expenditure of \$120,000	Access to stable electricity supply - Computer literacy - Need for high speed telecommunication network - Training of professional staff - Capital expenditure of \$120,000	Access to stable electricity supply - Adequate infrastructure - Trained staff - Educated society - Capital expenditure of \$150,000	Support from the Government - Allocation of a specific room with computers - Capital expenditure of \$100,000	Efficient and reliable network server - Capital expenditure of \$130,000	Access to stable electricity supply and ongoing finances - Capital expenditure of \$200,000	Access to stable electricity supply - Capital expenditure of \$150,000	Access to stable electricity supply - Computers and internet. trained staff - Capital expenditure of \$120,000

## **Benefits perceived**

It can be seen from the interview responses that a wide range of benefits are perceived with regards to DL systems. Wider access to information as a benefit is perceived by all the representatives of the eight libraries interviewed for this research. According to Yao and Zhao (2009), people can get access to the information in DLs without any restriction of time or location. This is made possible due to the ICT, economies of scale and easy conversion.

Eke (2010) explains that the library should show leadership in intellectual property and digital rights. Mclean and Sander (2003) pointed out that this is an area of research for library leadership but it will be more effective if done in relation to the development of content management systems.

Choi (2006) asserts that DL projects are implemented to generate, disseminate, and protect information in order to fulfil information needs of the users within a digital environment. According to Pomerantz and Marchionini (2007), a library plays a key role in the dissemination of information resources by organizing them and making them available to the members of the public. A library also provides important services to end users such as stakeholders, students, researchers whether visiting in a casual capacity or as a regular. Pomerantz and Marchionini (2007) also found that over the years the library has evolved as complexes of buildings, rooms and mobile spaces in which publications and people come together. Pacios (2007) believes, concurrent with changes in the environment, that libraries in particular public libraries, continuously try to adapt to accomplish their information, literacy, education, and culture goals.

According to Rosa and Lamas (2007), a key benefit of the online DLs is their ability to make bibliographic resources, including the most recent publications, available anytime and anywhere as far as a computer with internet access is accessible. Nkanu and Okon (2010) suggest that with modern technology, we can have access to information anywhere and at any time of the day. In the current era, Libraries are considered as a widely accepted means of providing timely, precise and efficient information services.

Ignatow (2011) explains that citizens without access to newspapers, books or the internet have little if any legal chance to grow the human resources needed for socio-economic advancement. Thus public libraries would seem to be more crucial than ever before, at least for those nations on the lookout for advancing from agriculture and small value-added

manufacturing to knowledge-intensive services and research areas. Das, Dutta, and Sen (2007) found the online DL is a result of recent innovations in the areas of ICT, where the end users can get full-text access to required information at their workstations without delay, but with high level of satisfaction. According to Karim and Dih (2009), technological advances in the areas of educational delivery and information access have affected the way learners and researchers obtain and disseminate knowledge and information through the use of ICT. Ruiz, Mintzer and Leipzig (2006) also found there is enough evidence to suggest that e-learning is relatively more efficient because people gain skills and knowledge faster than by relying on traditional instructor-led methods. These learning process efficiencies translate into better performance and enhanced motivation for learners.

Chu et al. (2008) describe the role that DLs play in e-learning and how DLs have the potential to benefit e-learning. As far as course material is concerned, there are the following benefits of storing course materials using digital archives: safety, security, ease of access and reliability. In addition, a study by Marchionini and Maurer (1995) suggest that one of the greatest benefits of DLs is the way they facilitate the accomplishment of formal, informal, and professional learning missions. The important role the DLs play in education and, in particular in distance-learning, are well-recognised. It was explained by Darzentas (1999) that the importance of two factors, which play a key role in enhancing participation in educational practices and activities. One emphasizes the importance of the constructivist pedagogical model, which influences much of the present day educational thinking and puts great emphasis on the notion of learning by self-discovery and exploration. The second contributing factor relates to the technological innovation, which enables access to an increasingly wider array of materials and Resources.

Other perceived benefits include reduced cost and time, sharing of information by multiple users and the possibility of unified search across a range of Library material. According to Lee et al. (2005), one of the key benefits of the DL systems is the information sharing. DL systems place digital information on a network and this makes the availability of information to everyone much easier. These days, many digital libraries are operated from a single central location. This is a great improvement over costly physical doubling-up of little used material, or the problem of unique material that is inaccessible without traveling to the location where it is stored. This identified by Das et al. (2007) as compared to the use of electronic resources,

searching information from within the physical hard-bound documents is relatively painful and time consuming.

In conclusion, a range of benefits were perceived with regards to DL systems. These included availability of information at any time during the 24-hour period, improvement in e-learning and ability to build new knowledge, reduced cost and time, sharing of information by multiple users and the possibility of unified search across a range of Library material. Other perceived benefits included little physical space required for storage of multitude of information and availability of automatic back-ups for all the saved documents and reports. It was also suggested that DL systems can preserve special and rare information in particularly in war-torn countries such as Iraq.

### **Inhibitors for Adoption of DL**

As can be seen from Table 1, out of the eight participating libraries in this study, six regarded disruption to the electricity supply as the key inhibitor for the adoption of DL systems in Iraq. Ishaq (2001) explains that access to DLs requires an internet device, such as a personal computer (PC), electricity, and an internet service provider. Hopkinson (2009) believes that ordinary libraries (both public and academic) in developing countries always were deficient in a wealth of possibilities for library automation. Other issues raised by Hopkinson (2009), ranged from the disrupted power supply to the problems of professional development of staff. A related issue commonly ignored is on the subject of collaboration both within and between institutions. This will assist the libraries to get a library automation project off the ground and then sustain it.

Poor literacy rate and, in particular, the low literacy rate for English and basic IT skills was also considered as an inhibitor to the implementation of a DL system in Iraq. Munster (2005) asserted the need to understand the existing gap in information literacy in different societies that currently exist in the world today. This issue is not specific to 3<sup>rd</sup> world countries or under-developed countries of the world. It is a global issue and thus it needs to be looked at in a holistic way. According to Kavitha (2009), IT is the acquisition, processing, storage and broadcasting of vocal, pictorial, textual, vivid and numeric information by a microelectronic based combination of computing and telecommunication. Kavitha (2009) went on to say that use of IT in our libraries can generally be categorised into two groups: the generation of information, knowledge; and its broadcasting and communicating it to the end user. The second aspect relates to the in-house processes and activities of libraries.

Choi (2006) explains libraries make use of information technology in order to provide access to their holdings in electronic format. Additionally, they develop a customized set of information package and other resources especially designed to meet the information needs of the Users.

In terms of infrastructure and ICTs, there is a lack of necessary infrastructure, physical telecommunication network, and internet connection, according to Gunawardana (2005), for e-learning activities to succeed in developing countries, there is a need for another important pillar, the existence of infrastructure, along with some level of connectivity. According to Prensky (2010), at the time of considering ICT-supported learning, one should be more specific about the sector which is under discussion. Within this framework, ICT-supported learning is as a new form of learning that is reliant on the internet and other ICTs for content access and delivery of a wide range of digital materials, communication, interaction and cooperation across remote communities. Kavitha (2009) determines that there is no doubt that ICT has brought a number of stimulating and potent new resources to our libraries.

Generally speaking, maintenance of the ICT is a resource intensive task because it would need specialist and trained workers with the right equipment available. This is not an issue for any first world country, but it is an uphill task for the third world Countries. Third world countries would be hard pressed to deliver ICT maintenance service because they have not yet reformed their educational systems (Kruger, 2010).

Lack of high-speed networks and out-dated communication technology were regarded as barriers in Iraq. According to Witten et al. (2001), in developing countries, the main priorities are education, health, hygiene, sanitation, supply of food and safe drinking water. So computer is not necessarily the key priority. However, consistent and simple ways of accessing targeted information to meet basic needs can be a priority.

It was also suggested that poor culture of reading e-books has resulted in a lack of e-book readers. Throughout the world, paper has served as the key medium for recording and archiving human knowledge. Its degradation and decline is considered as one of the most serious issues for library and archival materials (Bankole, 2010). Although these days readers in most countries have access to electronic resources, but most of the historical records are still in hard copy format. Many readers still prefer the print media and want to read hard copy newspapers and books etc. In a recent survey, 86 per cent of 100 respondents including office

workers, students, scientists and administrators, indicated that they would not throw away paper documents even when they had an electronic copy of the same document (Hart and Liu, 2003).

It was also pointed out that negative cultural attitude towards modern technology acts as a barrier towards the adoption of DL systems in Iraq. Selwyn (2003) believes that it is important to emphasize that people have their own valid reasons for not getting involved in activities mediated by ICTs. Activities, such as e-mailing, browsing the net and using various applications may not be a part of their everyday life, and thus they may not be able to justify the need to invest extra time, emotional efforts and money in learning new skills needed to use ICT. It is widely acknowledged in the literature that people need to have a “gripping proposition” to learn ICT skills. Passos et al. (2008) concur, explaining that the capabilities of the information professionals in the planning and operational aspects of DLs are essential to the discussions about the deep changes from the analogical culture to the digital culture.

In conclusion, disruption to the electricity supply was a key inhibitor for the adoption of DL systems in Iraq. Poor literacy rate and especially lower literacy rate for English and basic IT skills, was also considered as an inhibitor. Lack of high-speed networks and out-dated communication technology and networks were regarded as barriers. Poor culture of reading e-books and resulting lack of e-book readers was also regarded as one of the inhibitors. It was also suggested that a negative cultural attitude towards the adoption of modern technology can act as a barrier towards the adoption of DL systems in Iraq.

### **Implementation of DL**

Responses from the interviews suggest that implementation of DL systems in Iraq is difficult due to insufficient reliable bandwidth for internet connection, lack of secure networks and slow or zero internet speeds. According to Rosa and Lamas (2007), internet connections in developing countries are costly and slow, and appropriate infrastructure is lacking. These days most of the DLs can be accessed using web browsers. However, in developing countries, access to the internet is insufficient and thus there is a need to run the system locally. Therefore, DL systems meant for broad access need to run on a wide range of computer systems, especially low-end ones (Witten, 2004).

With a high illiteracy rate in Iraq and with a low rate of IT and English literacy, the implementation of DL is highly problematic. With regards to ICT skills, the literature

increasingly promotes the need to go beyond simply teaching IT skills. It emphasises e-literacy and media skills (Cushman & Klecun, 2006).

In addition, lack of professional properly trained library staff and almost non-existent training budget contribute to in low implementation of DL systems. Adams and Blandford (2002) have an interesting stance on the role of the librarian. According to them, a librarian acts more like a psychotherapist, who's skilful inquiring helps the user to appreciate their needs and to meet those needs. Kajberg (1997) suggests that DL technology has started to shape the roles and responsibilities of librarians to produce new professional identities, such as the educator, the net navigator, the information consultant, and even the gatekeeper to a wealth of intellectual resources.

It can also be identified from the responses (Table 1) that lack of telecommunication network infrastructure, lack of requisite hardware and software, and clear deficiency in the number of computers also problematise the implementation of an effective DL system in Iraq. Kavitha (2009) has identified the need for hardware and software to preserve today's documents. Nkanu and Okon (2010) make a distinction between access to computers and telecommunication requirement; they argue that computers provide the necessary base for the processing, storage and recovery capabilities. On the other hand, telecommunication provides the capabilities for the transfer and/or communication of data (and information) from one work station to another in the library in an efficient way.

Eke (2010) explains that resistance to the adoption of modern technology is also considered an issue in implementation. Bryson (2010) points out that the introduction of modern technologies and, in particular IT, has had far-reaching impacts upon organizations such as libraries.

In conclusion, the implementation of DL systems in Iraq would be difficult due to insufficient reliable band-width for internet connection, slow or zero internet speeds, and lack of secure networks. Furthermore, lack of professional, properly trained library staff and low training budgets result in low implementation of DL systems. Lack of telecommunication network infrastructure, lack of requisite hardware and software, and clear deficiency in the number of computers are also regarded as challenging towards the implementation of an effective DL system in Iraq. Resistance to the adoption of modern technology is also regarded as a hindrance for implementation.

## **Resources needed for adoption of DLs**

Responses to the interviews suggest that improvement in the literacy rate of the Iraqi public would be a positive step towards the adoption of DL systems, because an educated community is more likely to make informed decisions. In today's world most communication is computer-aided, which poses a major concern for those individuals who are computer illiterate. In the education sector, computers have made remarkable impacts to augment learning. These impacts come in the form of distance education, online learning, and e-learning (Eke, 2010).

Unlimited access to electricity supply, provision of high-speeds telecommunication networks, adequate infrastructure and ongoing financial support from the government are considered as the key resources required for adoption of DL technology in Iraq. Klecun (2008) advocates the need for a strong government role and commitment in addressing the digital exclusion in terms of making sure that remote areas have adequate information infrastructure. Furthermore, ICT centres and courses need to be made available in disadvantaged areas and free access to the internet offered in libraries and schools, while at the same time protecting public space in media. Different actions are required at different levels. For example, the struggle to keep up various services should be continued in communities, but also at the national level. At the same time, the experience of teachers and students involved in local e-literacy courses needs to be harnessed to pressure the government to fund non-accredited courses that facilitate the student-led agendas and more informal form of learning (Klecun, 2008).

Ignatow (2011) explains that throughout the world, public libraries provide citizens of all ages with important cultural material, including books and other media, plus a calm and quiet environment for reading, support for formal education and public spaces for community events.

Training of the library staff and allocation of specific rooms with computers within the library premises are also considered equally important resources likely to trigger a faster adoption of the DL technology in Iraq. Eke (2010) explains that librarians need to apply their skills on metadata creation in order to develop and tag learning objectives and building object repositories in developing countries. Pacios (2007) determines that under the changing circumstances, libraries especially public libraries also get impacted by the rapid evolution of

IT and of social and demographic changes. They have to continually make an effort to adapt to deliver their information, literacy, education and culture goals.

Users are a vital element of the DL. They include: the end users, information creators, clients and librarians; the designers who apply the knowledge to define, adapt and maintain the DL; the administrators who decide on appropriate software needed to assemble the DL; and the application developers who develop the software (Anunobi & Ezeani, 2011). In order for users to gain maximum benefit from working with the library, they need to quickly grasp an understanding of core library features, content and structures (Blandford, Stelmaszewska, & Bryan-Kinns, 2001). Blandford et al. (2001) also emphasize that the end users are normally individuals who have no specialised skills in the information retrieval, and are accessing library resources from their own desks, without active support of a librarian.

Libraries have developed various promotional campaigns and community awareness programs to cater for the needs of illiterate end users, people from non-English speaking background, and end users residing in rural and remote areas (Salinas, 2003). At the same time, Librarians need to find strategies to address the barriers that keep certain sectors of the library community from acquiring the benefits that digital technologies offers (Salinas, 2003). It is widely that accepted providing professional training must be given to librarians to make them well aware of theoretical and matter-of-fact issues of DLs (Liu, 2004). Such an approach reinforces the suggestions of Hastings and Tennant (1996) that DLs need digital librarians. Digital collections must be carefully selected, acquired, organized, made accessible to a range of users, and preserved. Digital services must be properly planned, thoroughly implemented, and fully supported (Hastings & Tennant, 1996).

In terms of capital expenditure required for the adoption of DL systems in Iraq, proposed amount varied between \$120,000 and \$200,000. DLs are vital mechanisms for developing countries in their fight to access bibliographic material. While attempting to address basic issues, these countries have, however, serious difficulties in putting their limited capital into building DLs (da Rosa & Lamas, 2007). Choi (2006) also identified that a DL should offer novel services along with conventional services to become an information service centre, rather than being simply an information depot. According to da Rosa and Lamas (2007), apart from the significant cost involved in building DLs, developing countries face quite a few other problems related to having operational DL services. It was explained by Kavitha (2009), that the purchase of necessary equipment to access digital information is another

burden on the libraries, which has impacted the quantity of purchases in all libraries. In this context, it has been rightly pointed out that libraries no doubt need money for lawful purposes, such as paying salaries/wages, upgrading networks, and computing capabilities, maintaining and modernizing aging physical facilities, and maintaining a conventionally acquisition-oriented library while simultaneously building the business case for DL systems in the future.

To sum up, improvement in the literacy rate of the Iraqi public can be a positive step towards the adoption of DL systems, because an educated community is well placed to make informed decisions. Unlimited access to electricity supply, provision of high-speed telecommunication networks, adequate infrastructure, and ongoing financial support from the government is regarded as the key resources required for adoption of the DL technology. Training of the library staff and allocation of specific rooms with computers within the library premises are also considered important resources likely to trigger a quicker adoption of the DL technology. In terms of capital expenditure required for the adoption of DL systems, the suggested amount varied between \$120,000 and \$200,000.

## **Conclusion**

The benefits of digital libraries are widespread. They are able to give free unhindered access around the clock, contribute to the socio-economic progress of a country, and help storage and access of rare historical manuscripts and documents. The main barriers to effective implementation of digital libraries are poor literacy, poor English language and ICT skills, and lack of investment in infrastructure. Cultural issues also play a part in DLs not reaching common people, and so does the high cost of digital equipment. Some of the practical aspects of implementation of DLs with respect to high capital cost, equipment and infrastructure were discussed, and found to be of great significance.

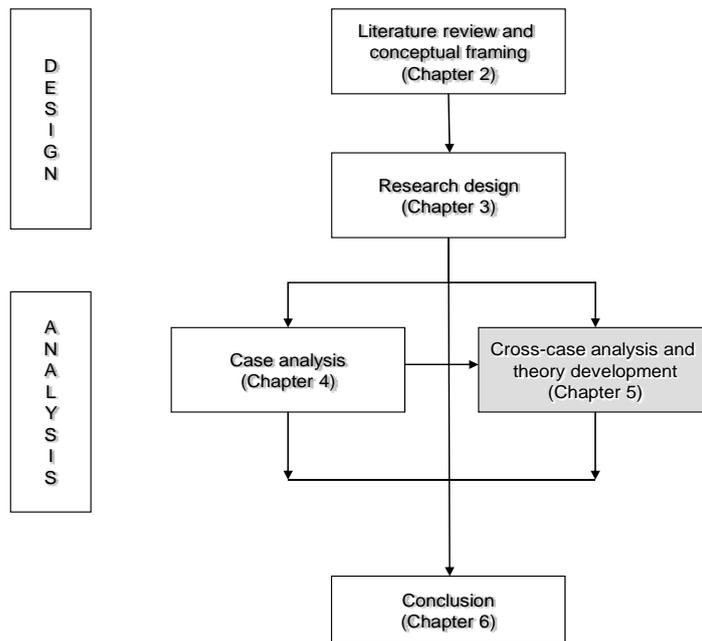


Figure 6. Thesis design - chapter 5

## Chapter 6 – Conclusion

*In modern research, more value is associated with studies involving numerical data and statistical methods. The same reception is not given to studies involving qualitative methods of interpretive social sciences, research based on case studies and critical social theory. It is, however, to be noted that research based on case studies has the capacity to create detailed descriptions and enable richer comprehension of social circumstances which are relevant and resonate across society. Hence, it is often argued that qualitative case study methodology offers valuable research plans and more understanding for makers of public policy. (Macpherson, Brooker, & Ainsworth, 2000, p. 49)*

In this chapter, the researcher summarises the results of the study, mainly in terms of benefits of DLs and the inhibitors against their implementation, and then draws a conclusion to the thesis. Further implications of this study, especially in the case of implementation of DLs in conflict-affected regions are also presented.

### **Benefits**

The benefits of DLs are universally recognised, and can be broadly classified in terms of richness and reach of information. DLs can be effectively used to store, process, transmit and manage information. The DLs can be used to collect, store and reference ancient manuscripts, research, inventions and stories. In a country such as Iraq, with a history of more than 6000 years, DLs provide for an efficient system to store priceless historic manuscripts and make them commonly available. Many manuscripts are delicate to handle, and there is also the danger of theft and damage, and hence access would be highly restricted. DLs enable these manuscripts to be digitalised, and made available to everyone.

The researcher's survey of eight libraries in Baghdad identified many benefits of digital libraries, such as preservation of material, access to delicate manuscripts, student research, access by women, It was apparent that Iraq had suffered considerable losses of valuable manuscripts and books during the years of war. The senior librarians interviewed were well aware that using DLs would reduce the risk of these losses because the data is generally stored in multiple locations. DLs also provide an opportunity to showcase the rich cultural

heritage of Iraq to the entire world, and also provide access to research scholars who would otherwise be unwilling to travel to areas of conflict.

The literature showed that DLs are helpful for students to search for online catalogues, and make it easier to access research journals and latest research publications. They would eliminate the need for a librarian with specialised knowledge; instead the student could undertake the search using the tools available in the DL system.

The traditional library system consists of mainly written material; and DLs, on the other hand, also include videos, audio, and other multimedia material. DLs can be hyper-linked with cross references, hence enabling building of an intelligent network. Thus DLs can provide an efficient and quicker access to information from anywhere or any device. This effectively breaks down the barriers of language, culture, accessibility, distance, etc.

DLs once setup, would be cost effective, with the cost of running and maintenance much lower than traditional libraries. The access is round the clock and throughout the year. DLs require less space, and can also be backed up in multiple locations. This is particularly helpful in insurgency-affected countries like Iraq, or countries prone to natural calamities.

In an Arab society, women face many restrictions, and as such in some families they would not be able to visit public places like a library. In the DL system, since the information can be accessed from the comfort of one's home, women would no longer be restricted from accessing the required information, which would go a very long way in increasing the knowledge and literacy levels of Arab women.

## **Inhibitors**

However, there are many inhibitors to the implementation of DLs, which can be classified as internal or external.

### **Internal inhibitors**

The main inhibitor is the initial cost of implementation of DLs which is quite extensive, and more so in poorer economies. The research in Iraq indicated that there are insufficient funds to pay for the applications and implementations.

It was universally explained that a lack of English literacy was a major inhibitor to implementing DLs. Staff at DLs need to have specialised skills, especially good English

skills. In countries such as Iraq, this might pose a challenge as English is not the common language.

In addition, the staff also needs to be trained in technical skills, in relation to day-to-day functions such as maintenance, backup, recovery of the DL. In this research, the interviewees identified that they do not have sufficient IT knowledge to implement and maintain DLs. The technology used in DLs also undergoes constant changes (for the better), so there is a need for the staff to keep updating their technical knowledge. Hence ongoing training is an important driver for efficient DLs.

Before embarking on the implementation of DLs, it is essential for to properly plan and lay a timetable of action. It also requires international experts to be included in the planning and implementation process. This might be costly and also care should be taken that the experts have adequate experience, and can implement the project successfully.

### **External inhibitors**

It was apparent from the case study research that external inhibitors are major impediments to DLs. For libraries to implement DLs they require government funding and it was envisaged that the government does not have sufficient funds to be able to support DL acquisition and implementation. Senior librarians in Baghdad estimated the cost of implementation of DLs to be roughly \$120,000 each, which is quite a sum for a developing nation. Implementation of DLs, therefore, requires support from the government. Funding is also essential to improve the English language skills and technical skills of library staff, and students. It is also essential to keep in place agreements made with other worldwide digital libraries for sharing of resources and information, and as such should not be affected by political pressure or conflict.

As with the librarians, the users' level of English is not adequate to use or review the material stored in DLs. This would be a challenge in countries such as Iraq, especially in regards to students coming from rural areas. Because Arabic is the most commonly understood language, citizens would find it difficult to search through the digital catalogue which would be in English. Hence, it would require a staff to be posted permanently just to search for the information in English. Similarly, some level of technical skills, like usage of computers, internet, browsers, and other tools would be essential. These become major inhibitors for implementation in countries like Iraq, which suffer from a low level of literacy.

It was recognised by all eight libraries in Baghdad that the intermittent power supply would restrict and inhibit the benefits of DLs. Round-the-clock electricity is not always available in poorer economies, and hence poses a challenge, as electricity is vital for running the servers and keeping the DL online.

A lack of internet availability, and very slow internet speeds, were highlighted as major restrictions on the use of DLs. There needs to be robust digital infrastructure, in terms of internet and telecom connectivity, as the DL would have to connect with other DLS around the world, and provide the information in a timely and efficient manner. A high speed internet connection is essential for the working of digital countries.

It was noted that the majority of the population do not have computers and that there are insufficient computers readily accessible in Iraq to provide the claimed benefits to society. DLs also need the patrons to have good internet connectivity and computer equipment, and often the cost of owning digital equipment and internet costs in third world countries may not be affordable to common people. There was also the danger of DLs benefitting only the richer sections of society, and the weaker sections of society being left behind in the spread of knowledge as they do not have the economic means of owning digital equipment. It was suggested that even if there were improved internet access and more availability of computers, the lack of ICT knowledge of the population would restrict the DL usage.

The research in Baghdad libraries indicated that there would need to be a cultural change from the preferred and traditional use of paper to reviewing information on computers. Cultural changes are potentially the most difficult to overcome. People are generally used to reading material recorded on paper, and might not easily get accustomed to reading on the computer screen. A major shift in the mindset of people is therefore essential for DLs to be successful.

In conflict affected countries, the laws governing digital transmission of information, protection of copyright and intellectual property, protection of privacy of individuals, etc., are poorly defined and also very difficult to implement. This is a major challenge in the implementation of DLs, as these issues will impact interaction and collaboration with other global digital libraries.

DLS cannot be successful unless supported by strong infrastructure support. The cost of implementation of DLs could be a major inhibitor, because in developing countries the major

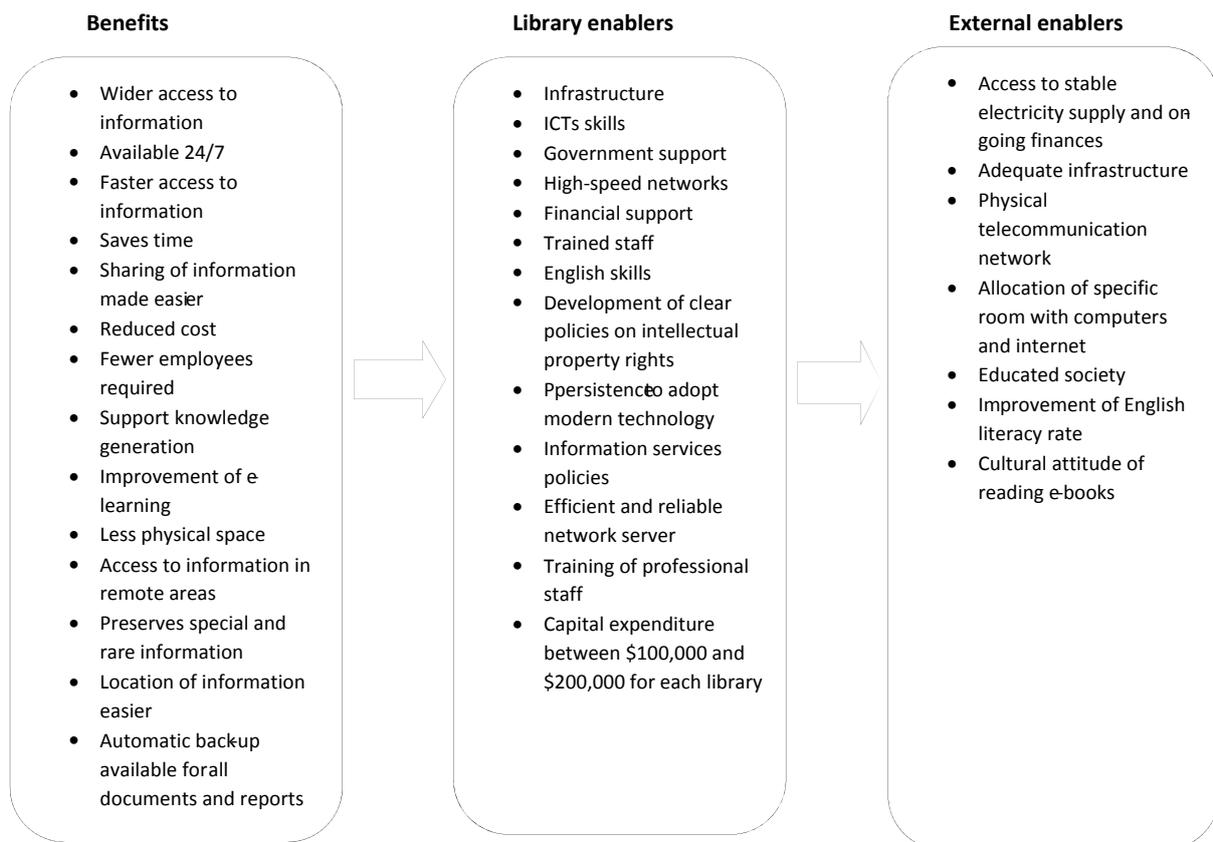
priorities are health, education, and providing for the basic needs of the citizens. There is also a need to make available the digital technologies on wide range on platform, instead of having it accessible on costly operating systems and devices.

## Conclusion and Recommendations

DLs are large structured collections of information. Well-designed and elegant DL software has the potential to facilitate even non-specialist people to conceive, assemble, develop, and circulate new information collections. This can have great social effect as it democratizes the distribution of information. Especially, it will create a revolution in the way in which educational policies are conducted and educational material is prepared.

The benefits and the internal and external enablers of those benefits that have been identified in this research study are shown in table 3.

Table 3. Benefits and enablers



Introducing DLs in the public and private sectors in Iraq has the potential to create many challenges and issues. However, public libraries along with the private libraries could be an essential part of any strategic approach to bring DLs into Iraq in a methodical and cost effective manner. The development of new technologies and new models of public and private libraries (for instance those pertaining to education) would create several new opportunities for the education sector in Iraq. These opportunities would need the government policy makers to invest necessary time and money into developing a new workable policy framework to facilitate public and private libraries.

Telecommunications infrastructure is an important component in providing DLs. Telecommunications infrastructure is a subsystem of fundamental services, facilities, and fittings that exist to assist in information access. The setup may include items such as telephone, broadcast services, schools, libraries and other facilities, and electric and telecommunication fittings that support system, wherein information can be provided or accessed. This would provide a means for developing the Iraqi community in various ways, such as providing easier access to advanced knowledge, more resources, and greater educational opportunities for the community. Iraqi libraries would also be able to preserve their remaining books and other publications. The safeguarding of digital information is now an important and crucial area of discussion and activity. All libraries are responsible to ensure that information is available to their users for the period they need it.

In summary, information is essential for the progress of mankind, and access to the same is essential for the redemption of the weakest sections of society. Recent technological advancements have led to the widespread use of DLs worldwide. However, DLs require IT and English skills, hardware and software. Iraq has suffered greatly due to conflict, it is now essential to implement DLs for the nation to take its place in the global economy.

### **Limitations**

The limitations of this study have been explained in detail in chapter three. The major limitation has been the availability of data. Data has been restricted by the destruction of libraries and the difficulty, due to security restrictions, of accessing libraries outside of Baghdad. This has the potential to limit the generalizability of the study. Nonetheless, the study is viewed as broadly characteristic of the phenomenon in Iraq.

## **Implications for practice and research**

The study is significant because the researcher has identified key constructs of adoption of DLs in Iraq. It is a possible guide for studies of the potential for DLs in other countries such as Afghanistan or Pakistan. It is also possible that the findings of this study would be useful for initiating action research into the implementation of DLs and forms a priori to more in-depth research about the phenomenon.

The implications for practice are extensive, with the major implication being that many initiatives need to be undertaken and need to be performed by agents with broader control than a library. The government of Iraq, and perhaps other nations that have the ability to support the development of Iraq, can use the findings of this research study to help the nation to recover and hopefully prosper.

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## Appendix A. Semi-structured interview guide

### Interview guide

- What technology is currently used in the library and what is its purpose?  
Probes:
  - How old is the software?
  - How is the software maintained?
  - Do you have manual systems, if so what do they comprise?
- What are the advantages and disadvantages of the current method (retrieval, tracking, loss of books, etc.)?  
Probes:
  - What do you believe is the level of satisfaction of library users?
  - Are library staffs satisfied with the systems?
- Do you understand the concept of a digital library?  
Probes:
  - Can you explain how you conceptualise digital libraries?
  - Have you had any experience with a digital library?
- What do you perceive to be the benefits of a DL?  
Probes:
  - Can you identify specific tangible or intangible benefits?
- Do you believe that a DL system will be implemented in your library? If so when?
- What has inhibiting the introduction of a DL?  
Probes:
  - Can you identify specific infrastructure inhibitors?
  - Can you identify specific funding inhibitors?
  - Can you identify specific society inhibitors?

- What would be needed to facilitate the implementation of a DL?

Probes:

Can you identify specific infrastructure that would be required?

Can you identify specific funding that would be required?

Can you identify potential sources of funding?

Can you identify specific society changes or education that would be required?