# BEST PRACTICE IN A DIGITAL LIBRARY OF ARABIC MANUSCRIPTS

by

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# Abstract

For ages past, inscribed culture heritage materials have been preserved, organised, and disseminated by libraries, museums, and archive centres. Arabic manuscripts, as one of the most fragile and valuable examples of mankind's heritage, are kept in different parts of the world. With the increasing demand for these manuscripts by users, many Arabic manuscript holders have tended to use technology in order to preserve this fragile information resource and provide a better service for users. Digital libraries open new frontiers for Arabic manuscript providers and end-users. In the last five years, a number of digital libraries providing access to some Arabic manuscripts have been launched in several parts of the world. There are also ongoing projects to establish a digital library of Arabic manuscripts (e.g. in the Kingdom of Saudi Arabia).

A number of studies have called for the involvement of users in building and maintaining digital libraries to provide a better service. This study aims to explore and specify Arabic manuscript users' (providers and end-users) requirements to provide best practice for digital libraries of Arabic manuscripts. In order to elicit Arabic manuscripts users' requirements, the study has employed both desk research and a mixed methods approach. This study has selected the Kingdom of Saudi Arabia (KSA) as the research environment.

The findings of this study show willingness by number of Arabic manuscript providers to establish a digital library of Arabic manuscripts. In addition, the majority of surveyed end-users have previous experience of using internet resources (e.g. digital libraries) for locating and accessing Arabic manuscripts. End-users have specific requirements based on their information-seeking behaviour which are in contrast with those of providers, such as obtaining a hard copy of a manuscript.

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## Romanisation Process

In this study, Arabic names, nouns, and titles were transliterated according to the Library of Congress Romanization of Arabic system (see the following Table). The researcher has chosen this approach as it is commonly used in the field of studying Arabic manuscripts. Moreover, many catalogues, handlists, and even digital libraries have transliterated manuscripts' titles, names, etc, to avoid mistranslation. However, in some cases the researcher has translated titles of books or manuscripts when required. WorldCat.org has been utilised to export bibliographic records of the cited references in this study. A number of libraries in Arab countries (e.g. Kingdom of Saudi Arabia KSA) have cooperated with OCLC with regard to cataloguing Arabic books through making their bibliographic records available via WorldCat. These records are in Arabic language and in romanised form.

Example of the Romanisation system:

*Kitab* = كتاب= Book

*Muhammad*= محمد

**Table of LC Romanisation of Arabic**

| No | Alone | Final | Middle | Initial | Romanization |
|----|-------|-------|--------|---------|--------------|
| 1. | ا | ـا | | ا | a, ⁻a * |
| 2. | ب | ب | ـبـ | بـ | B |
| 3. | ت | ت | ـتـ | تـ | T |
| 4. | ث | ث | ـثـ | ثـ | Th |
| 5. | ج | ج | ـجـ | جـ | J |
| 6. | ح | ح | ـحـ | حـ | H |
| 7. | خ | خ | ـخـ | خـ | Kh |
| 8. | د | د | | د | D |
| 9. | ذ | ذ | | ذ | Dh |
| 10. | ر | ر | | ر | R |
| 11. | ز | ز | | ز | Z |
| 12. | س | س | ـسـ | سـ | S |
| 13. | ش | ش | ـشـ | شـ | Sh |
| 14. | ص | ص | ـصـ | صـ | ṣ |
| 15. | ض | ض | ـضـ | ضـ | ḍ |
| 16. | ط | ط | ـطـ | طـ | ṭ |
| 17. | ظ | ظ | ـظـ | ظـ | ẓ |
| 18. | ع | ع | ـعـ | عـ | ' |
| 19. | غ | غ | ـغـ | غـ | Gh |
| 20. | ف | ف | ـفـ | فـ | F |
| 21. | ق | ق | ـقـ | قـ | Q |
| 22. | ك | ك | ـكـ | كـ | K |
| 23. | ل | ل | ـلـ | لـ | L |
| 24. | م | م | ـمـ | مـ | M |
| 25. | ن | ن | ـنـ | نـ | N |
| 26. | ه | ه | ـهـ | هـ | H |
| 27. | و | و | | و | W |
| 28. | ي | ي | ـيـ | يـ | Y |
| 29. | ة | ة | | | T |

## Research Key Terms

**Arabic Manuscript (AMS):**

This is an Arabic text that was written by hand in a codex form before the invention of printing in Arab countries.

**Palaeography:**

This is the study of ancient handwriting, based on accurate reading of the text, and verifying the author and date of the handwritten manuscript. The person who does this is named a palaeographer.

**Codicology:**

This is the study of physical nature of the manuscript. The person who does this is named a codicologist.

**Editing Arabic manuscript:**

This is the process of reproducing the original text of the author of the manuscript in the form of a book or academic thesis. Conducting an editing of Arabic manuscript requires palaeographic practice and codicology data.

**Users' requirements:**

These refer to what expected user's desire and need from a digital library in order to fulfil his/her scientific or academic purposes.

**Providers of Arabic manuscripts:**

Those who hold and provide access to Arabic manuscripts. This may refer to institutions (e.g. libraries, universities, government bodies etc.) or individuals.

**End-users:**

These are individuals, such as scholars, students, and researchers, who are using Arabic manuscripts for scientific or academic purposes.

# CHAPTER ONE INTRODUCTION

## 1.1 Background of the Study

Maintaining cultural heritage does not mean only keeping and saving items in museums or dark rooms in libraries to preserve them for future generations. It is of great importance to make cultural heritage available to people, particularly those who participate in disseminating the cultural heritage, notably the written cultural heritage, such as scholars, researchers, students, and so forth (Ali, 2001). For many years, libraries, museums and archive centres have played a significant role in preserving, organising, and disseminating mankind's cultural heritage. Islamic civilisation, particularly in its golden age, which lasted for around six centuries (from the mid-seventh century to mid-thirteenth century), has contributed much to subsequent civilisations, and some of its rich cultural heritage remains (Turner, 1997). Arabic manuscripts (see Figure 1-1for an example) are one of the remaining legacies of Islamic civilisation. This heritage has lasted until the present day because it is part of mankind's heritage, and many scientific fields still rely on this heritage as a fundamental source of knowledge (Halwaji, 1989). Huff, T. E. (2003) stated;

> *"In virtually every field of endeavour –in astronomy, alchemy,*
> *mathematics, medicine, optics, and so forth –Arabic scientists (that is,*
> *Middle Eastern individuals primarily using the Arabic language but*

*including Arabs, Iranians, Christians, Jews, and others) were in the forefront of scientific advance."* (Huff, 2003).


This was the motivation of the Cultural Heritage Revival movement which has always been considered an important movement in the reproduction of the Arabic heritage in current media, e.g. books and theses (Halwaji, 2004). Universities in different parts of the world have taken the lead in the Heritage Revival movement by providing programmes and courses in Arabic cultural heritage and awarding academic degrees (e.g. M.A. and Ph.D) in certain fields of knowledge and in the publication of Arabic manuscripts (Halwaji, 2004). It is worth noting that commercial publishing has also played a significant role in publishing written works of Arabic cultural heritage.

Many libraries (e.g. academic, national, public, and special) that are interested in serving Arabic manuscript users have sought to acquire, preserve, organise and facilitate access to Arabic manuscripts. However, libraries have faced a number of problems in providing the required services to targeted users. These problems can be categorised into two main domains: the manuscript itself and the providers of Arabic manuscripts and end-users.

**Figure 1-1: An image of an Arabic manuscript**

The spread of Islamic civilisation from Central Asia to West Africa and from North Africa to the western periphery of the Pacific Ocean, and to some countries in the Europe continent (Robinson, 1996) has led to Arabic manuscripts being scattered around the world. Halwaji, (1989) states that acquiring and purchasing Arabic manuscripts as antiques has contributed to the dispersal of manuscripts around the world, even in one geographical location through preserving Arabic manuscripts in different libraries, for instance. Therefore, Arabic manuscripts are to be found in libraries (e.g. national, academic, special, private or personal), as well as in museums and archive centres. However, these manuscripts may sometimes be vulnerable to neglect and damage as a result of being kept for a long time in inappropriate places and environments. For instance, it was reported in the *Manchester Guardian* that many Arabic manuscripts in

Mauritania are under threat as a result of having been preserved in inappropriate conditions (Mandraud, 2010 ). This dispersal of Arabic manuscripts is a challenge to the user who wishes to obtain easy access to this type of sources.

The precise number of Arabic manuscripts in the world is not known (Al-Showaish, 2000). However, (Le Bourgeois and Kaileh, 2004) reported that there are estimated to be approximately 3 million Arabic manuscripts scattered around the world. However, this number is only an estimate, due to lack of bibliographic control of Arabic manuscripts. This has been affirmed by a number of studies which have highlighted that many Arabic manuscripts in different parts of the world have not yet been catalogued and recorded (Awwad, 1984; Halwaji, 1989; Mashukhi, 1989; Roper, 1992; Sa`Ati, 1993; Awdah and Atmah, 1997; Déroche et al., 2006; Kulayb et al., 2006). Consequently, Arabic manuscript users are having problem in locating and reaching un-catalogued or un-recorded Arabic manuscripts.

As is well known, Arabic manuscripts are considered historical materials that have distinctive physical and intellectual characteristics. Therefore, dealing with and allowing direct access to users of Arabic manuscripts by providers of Arabic manuscripts has always been done only under strict rules and regulations. For instance, it is common for stockholders not to allow the original manuscript to be perused outside the reading room where the manuscript is held, and users must undertake to take great care when looking at the manuscript (for example, by wearing gloves). Liew (2005) presents some

of the challenges that face users in terms of directly viewing cultural heritage documents or artefacts;

> *"Physical exhibitions of cultural heritage documentation which exist in museums, archives and libraries in different parts of the world are limited in demographic reach to one extent or another. They are generally open to the public for access only at certain times of the day. As most of the information or artefacts are presented in physical forms and are located in a certain physical location, visitors have to travel to a country, to a specific city, state or town, to a specific building and to a specific room or corner, and eventually to a specific spot, where the desired documents or artefacts lie. Some of the heritage documents or artefacts are only available for viewing because of rarity values or their fragile physical conditions. Users are not able to make use of them for detailed study and analysis. Teachers and educators, for instance, would find it difficult to customise the materials for teaching and learning purposes."* (Liew, 2005).

Hence, providers of Arabic manuscripts have often provided substitutes for the original manuscripts, such as photocopied manuscript images on paper and/or microforms (Halwaji, 2002). In addition, providers of Arabic manuscripts have attempted to provide access to their collection via printed catalogues, or handlist of Arabic manuscripts. In spite of the efforts of providers of Arabic manuscripts to facilitate access to Arabic manuscripts by using traditional methods, users are still facing challenges and barriers, such as geographical distance, time factor, and policy use. With the emergence of information technologies, libraries have sought to adopt and implement technologies to

provide the ideal information services, taking into account the characteristics of the sources and the needs of users.

Digital Libraries (DLs) have become an option for preserving and disseminating written cultural heritage in order to overcome barriers which traditional libraries have encountered in the location of and access to those materials by end-users (O'keefe, 2000; Crane et al., 2003; Nicolas et al., 2003; Tedd and Large, 2005b; Liew, 2006; Dorner, 2007). Digital libraries have many features that support their practice in the context of cultural heritage.

> *"The need to preserve cultural and historical heritage collections of fragile and precious artefacts has encouraged many museums, archives and galleries around the world to develop digitized collections for users from all over the world to access and study"* (Tedd and Large, 2005b).

In the context of Arabic manuscripts, digital libraries could provide better access to a wider audience (Le Bourgeois and Kaileh, 2004), overcoming the barrier of geographical distance by make them available online, allowing location of and access to digital libraries' materials at any time (Tedd and Large, 2005a), saving these fragile materials from frequent handling or misuse (Al-Khatib et al., 2007; M'kadem and Nieuwenhuysen, 2010), facilitating the location retrieval and consultation of digital libraries' collections by users (Liew, 2005; Leydier et al., 2005).

A number of projects have been carried out to digitise Arabic manuscripts, whether for making them available online via a digital library; for example. The Islamic Medical Manuscripts in the National Library of Medicine, the Jafet Library in the American University of Beirut, the Collection of Arabic Manuscripts in the National Library of the Czech Republic, the Memory of the World Programme, digitised Arabic materials at the Royal Library of Denmark, the Digital Library of Manuscripts at King Saud University, and so forth (Alshuhri, 2008), or simply for the purpose of preservation, such as the World Digital Library (WDL) led by UNESCO in cooperation with several international bodies, such as the Library of Congress, the Bibliotheca Alexandrina, King Abdullah University of Science and Technology, and recently, the National Library of Abu Dhabi Authority for Culture and Heritage (ADACH)1 , DigiIslam led by JISC in the UK, Digitising Islamic Manuscripts at Harvard, Princeton, Michigan, and other universities in the USA.

As far as Arab countries are concerned, there are many projects for preserving Arabic manuscripts, such as Preserving National Cultural Heritage in the Kingdom of Saudi Arabia (KSA), which is carried out by King Fahad National Library in the KSA. These projects aim to preserve Arabic manuscripts and provide reasonable access to Arabic manuscripts. However, utilising digital libraries for delivering historical materials such as Arabic manuscripts has always been a challenge. The establishment of digital

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[1]  According to a Middle East Online news item entitled "ADACH National Library joins World Digital Library". Available at: http://www.middle-east-online.com/english/?id=44324. Last accessed 17-02-2011.

libraries of Arabic manuscripts involves issues associated with Arabic manuscripts both physically and intellectually, as well as with end-users.

The majority of studies dealing with Arabic manuscripts in the context of digital libraries have focused on technological aspects (Agosti et al., 2005; Eglin et al., 2006; Shahab et al., 2006; Agosti et al., 2007b; Al-Khatib et al., 2007; Leydier et al., 2007).

However, specifying users' needs and requirements of the literature available in the Arabic and English languages has not received attention from researchers in terms of the creation of digital libraries for Arabic manuscripts.

## 1.2 Problem Statement

Digital libraries aim to bring their collections to their potential users, and should take into account the material's characteristics and the user's needs and requirements. The majority of current efforts and studies for making Arabic manuscripts available online via digital libraries focus on digitising, storing, organising, and visualising manuscripts. They tend, therefore to concern technological issues, such as digitisation equipment and standards, recognition of handwriting (e.g. Optical Character Recognition – OCR) (Khorsheed, 2003) (Shahab et al., 2006), as well as indexing, annotating, and retrieving Arabic manuscripts (e.g. Content Based Image Retrieval - CBIR) (Agosti et al., 2005); (Al-Khatib et al., 2007; Boussellaa et al., 2008). In contrast, studies of issues surrounding users' needs and requirements, and the information-seeking behaviour of those who are

expected to use and study manuscripts are rare in the context of digital libraries (Liew, 2006; Chen, 2007; Alia et al., 2008). Borgman (1999) defines a digital library as;

> *"a set of electronic resources and associated technical capabilities for creating, searching and using information"* and that *"..are constructed-collected and organized – by [and for] a community of users and their functional capabilities support the information needs and users of that community."*

This definition confirms the necessity of recognising and identifying users' needs and requirements, which should also be involved in developing and implementing digital libraries. This has been stressed by (Tedd and Large, 2005a), who stated;

> *"[A]s in the development and maintenance of traditional collections of materials in libraries, museums, archives, and so on, users are very important when developing and implementing digital libraries".*

This means that a digital library should take its communities of both providers and end-users into consideration. Kimani et al., (2005) stated that acknowledging users' needs and requirements can lead to:

> *"the gaining of a deeper understanding of the needs evolving from the user's operational environment and from the use of the system. User requirements are of key importance for guiding the development (and evaluation) process of any system. This is no less true in the arena of Digital Libraries"* (Kimani et al., 2005).

Users of Arabic manuscripts - academics and/or educators - are often both consumers and producers (Harun, 1965). The greatest use of Arabic manuscripts for scholarly purposes is made by users who rely on Arabic manuscripts as primary sources; thus, Arabic manuscripts are very important for their users in both their aspects, i.e., physically and intellectually (Harun, 1965; Halwaji, 2004). Most of the scholarly use of Arabic manuscripts in academia focuses on editing processes (editing Arabic manuscripts), which is based on codicology and palaeography, according to (Samarrai, 2001) definition of editing Arabic manuscripts. Therefore, users of Arabic manuscripts (end-users such as scholars, students, and researchers) have specific requirements that should be taken into consideration in establishing a digital library of Arabic manuscripts, particularly for those who are engaged in editing Arabic manuscripts. Principally, a traditional library has the role of a research and study environment, and a *"laboratory where reading is a primary exercise" (Crane, 2002).*

As a result, there are a limited number of studies, and these, generally, have addressed the information-seeking behaviour of manuscript users and their needs and requirements, and these are mainly categorised as being in the humanities field (digital humanities) (Buchanan et al., 2005; Liew, 2006; Chen, 2007; Alia et al., 2008).

In addition, the available literature that addresses Arabic manuscript users, particularly end-users in the field of editing Arabic manuscripts, which is the most common purpose for using Arabic manuscripts from both sides, information-seeking

behaviour and users' needs and requirements, have not addressed Arabic and English literature in the context of digital libraries.

In the light of the above there is a clear research gap. A sound knowledge of the needs of both providers and end-users of Arabic manuscripts is a prerequisite for the determination and implementation of a best practice in creating or extending digital libraries of Arabic manuscripts. However, as far as this researcher is aware, these requirements have never been thoroughly examined through empirical research.

Therefore, this study seeks to go some way towards bridging this gap by specifying users' requirements and exploring providers of Arabic manuscripts and end-users' most common requirements for scholarship and editing in order to make recommendations for a best practice in digital Arabic libraries .

This study has selected the KSA as the study field; firstly because it holds a large collection of Arabic manuscripts. According to the Directory of Libraries and Information Centers in the KSA, which was issued by King Fahad National Library (KFNL) in 2007, there were 226,804 manuscripts recorded in the KSA's libraries, archives, and information centres (King Fahad National Library, 2007). Second, due to the revival of Arabic cultural heritage in academic programmes and the commercial publishing of Arabic manuscripts from inside and outside the KSA, there is a great demand for access to these manuscripts. According to (Abd Al-Jabbar, 2006), from 1970 to 2000, there were 1,341 academic degrees based on edited Arabic manuscripts have been awarded by five KSA universities. Third, the Fifth Plan of Scientific and Technical

Information made a recommendation in 2004 to establish digital libraries of Arabic manuscripts in educational and governmental institutions. This plan was produced by King Abdulaziz City for Science and Technology. Finally, a number of the original Arabic manuscripts in the libraries in the KSA have been digitised by the King Fahad National Library (KFNL) under the auspices of the Preserving National Cultural Heritage Project (PNCHP) (see, 2.6.3.1 for further details).

This research addresses the best practice to establish a digital library of Arabic manuscripts in the context of end-users' requirements and Arabic manuscript providers' requirements for academic purposes (i.e., editing) in the KSA.


## 1.3 Research Objectives

As previously mentioned, this study aims to explore the requirements of providers and users of Arabic manuscripts in the real world and ways to accommodate these requirements in a digital library (i.e., the virtual world) in order to make recommendations for a best practice for digital libraries of Arabic manuscripts. Therefore, this study will attempt to achieve the following objectives:

- To examine and evaluate the efforts of some current digital library holders of Arabic manuscripts globally and locally.

- To identify and investigate the requirements of providers and users of Arabic manuscripts in the KSA.

- To provide guidelines for best practice for the implementation of a digital library of Arabic manuscripts.

## 1.4 Research Questions

To accomplish the study objectives, the following research questions will be investigated:

- What is the current situation with regard to building digital libraries of Arabic manuscripts globally?

- What are the current projects in the KSA that involve the building of digital libraries of Arabic manuscripts?

- What are the most significant characteristics and attributes of Arabic manuscripts that should be taken into account when establishing digital libraries of Arabic manuscripts? How can they provide better services?

- What digital libraries of Arabic manuscripts could benefit users, whether they are providers of Arabic manuscripts as provider or end-users as consumer?

- What are the challenges and obstacles that may arise in building a digital library of Arabic manuscripts in the KSA?

- What are end-users' academic requirements for digital libraries of Arabic manuscripts in the KSA?

- What are providers of Arabic manuscripts' academic requirements for digital libraries of Arabic manuscripts in the KSA?

- Are there any differences or conflicts in the requirements for establishing a digital library of Arabic manuscripts between providers of Arabic manuscripts as providers and end-users as consumers?

In this study these questions are addressed through desk research, interviews, and questionnaire surveys (Chapter Four, 112).

## 1.5 Research Outcomes

The outcomes of this research can be summarised as follows:

- A detailed report on digitising Arabic manuscripts in the KSA.

- A report on digital library projects of Arabic manuscripts in the KSA.

- A document of providers of Arabic manuscripts' requirements for establishing a digital library of Arabic manuscripts in the KSA.

- A document of users' requirement for establishing a digital library of Arabic manuscripts in the KSA.

- An evaluation report of current digital libraries of Arabic manuscripts in the light of gathered and analysed requirements.

- Recommendations for providing a best approach to building a digital library of Arabic manuscripts that can be implemented.

## 1.6 Delimitation of the Research

This study has a limited scope; it seeks to address as fully as possible the study domain, without venturing beyond it. Its boundaries are as follows:

*Subject limits:*

1. The study presents some of the most significant characteristics and features of Arabic manuscripts. It does not claim to cover all Arabic manuscript characteristics but to highlight the most significant characteristics

2. This research attempts to determine the requirements for establishing a digital library from a sample of Arabic manuscripts providers of Arabic manuscripts in the KSA (on page 128).

3. End-users who are interested in editing Arabic manuscripts are addressed in this study. Their requirements are subject to their real world practices.

4. A comparison between providers of Arabic manuscripts and end-users of Arabic manuscripts is discussed in this research (on page 226).

*Geographical limits:*

The geographical range of this research is within the KSA. Ten providers of Arabic manuscripts were selected. These providers of Arabic manuscripts are distributed in four cities in the KSA: Riyadh, Makkah Al Mukarramah[2], Al Madinah Al Munawwarah[3], and Jeddah (Figure 1-2). The end-users who were interviewed and surveyed by questionnaire were within the KSA borders.

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[2] The official name is Makkah Al Mukarramah; it has many spellings including Mecca, Bakkah, and Makkat.
[3] The official name is Al Madinah Al Munawwarah; it is also spelled Madina.

**Figure 1-2: Locations of Studied Providers of Arabic manuscripts in the KSA**

*Temporal limits:*

The researcher gathered information pertaining to Arabic manuscripts users' requirements of digital libraries between October 2009 and January 2010. That period of time was the beginning of new academic year. Tracking the progress in building a digital library of Arabic manuscripts is ongoing and continues as of writing.

*Language limits:*

The scope of this study is limited to Arabic manuscripts. Hence, manuscripts in other languages, such as Turkish, Persian, Urdu, etc. that are also used in Islamic manuscripts have not been included.

## 1.7 Limitations of the Research

The limitations of this study include:

*Substantive aspects of the research*

As noted previously, this study does not present all the characteristics and features of Arabic manuscripts. It presents the characteristics that are assumed to serve the study objectives (on page 34).

Technological aspects in this study have not been deeply analysed; rather, the most common technical requirements elicited from the study population and/or available literature have been highlighted.

*Geographical aspects of the research:*

It has been reported that Arabic manuscripts are scattered over different parts of the world (Brockelmann, 1967; Sezgin, 1991a). Within the KSA they are distributed across 95 libraries. The researcher was restricted to the KSA as a geographical location (on page 8).

*Temporal aspects of the research:*

Temporal aspects could play a significant role in changing users' requirements particularly if these requirements are associated with rapid changes in technology. Some requirements that were not significant a year ago may be very important to users now. In fact, when this research project was initiated in 2007, a number of services were not available in the digital libraries of Arabic manuscripts. For example, Wellcome Arabic Manuscripts Online was launched in 27 July 2011 (on page 91), but has only recently provided facilities for comparing two manuscripts (Figure 1-3). This facility was not

originally available in any digital libraries of Arabic manuscripts. In addition, this facility was ranked by users in this study in fifth place among the important services that could be provided (on page 223). Another example in this study, the Manuscript (Makhtota) Digital Library by Prince Salman Library (PSL), recently added a facility to edit manuscripts online (on page 95).

In view of the aforementioned limitations, the findings may not be generalisable outside the KSA. Indeed, in terms of the requirements of providers of Arabic manuscripts, as the sample was taken from only four cities in the KSA, they may not be representative of providers in other parts of the country. However, the researcher considers this to be unlikely, given that there was little variation in the requirements of the providers of the four cities from which the sample was drawn.



**Figure 1-3: Comparing Feature in Wellcome Arabic Manuscripts Online**

## 1.8 Contribution of the research

The contribution of this research is two-fold, as it offers a theoretical contribution to academics and a practical contribution to practitioners. In terms of the academic contribution, it adds to the currently very limited knowledge of the requirements that providers and users of Arabic manuscripts have of digital libraries of Arabic manuscripts. For practitioners, the contribution of the research lies in the recommendations for a best practice in the creation and expansion of digital libraries of Arabic manuscripts.

## 1.9 Structure of this Thesis

The remainder of this thesis is organised as follows: chapter two presents the background of Arabic manuscripts. Chapter Three addresses Arabic manuscripts in the context of a digital library. The methodology used in this research is discussed in Chapter Four. Data obtained in this study is analysed and discussed in Chapters Five and Six. Chapter Seven is the final chapter in this thesis; it discusses the findings in the context of the research questions and presents the research recommendations and conclusion.

# CHAPTER TWO ARABIC MANUSCRIPT

This chapter addresses Arabic manuscript as material. As mentioned in Chapter Two Phase One, a desk research method was employed to gain a better understanding and identify some issues relating to Arabic manuscripts in a digital library. This chapter presents a definition of Arabic manuscripts, as well as their history, importance, and some of their characteristics. Cataloguing and bibliographic description of Arabic manuscripts in real-world are also discussed in this chapter. As this study focuses on the Kingdom of Saudi Arabia, the status of Arabic manuscripts in the country is also presented.

## 2.1 Definition and Background of Manuscripts

There are several definitions of the term "manuscript" in the literature, depending on culture and/or discipline. This variation in definitions in different fields is noticeable. For example, in the context of Library and Information Science (LIS), there are agreements and disagreements over the definition of a manuscript, according to Western and Arab viewpoints (Al-Showaish, 2000). Harrod's Librarians' Glossary defines a manuscript as:

> *"A document of any kind which is written by hand, or the text of music or literary composition in hand-written or typescript form, and which, in that form, has not been reproduced in multiple copies" (Prytherch, 2005).*

The Library of Congress (LC) has defined a manuscript as:

*"A book, document, or other composition written by hand. A typewritten or handwritten version of a book, an article, a document, or other work, especially the author's own copy, prepared and submitted for publication in print." (Library of Congress: American Memory, 2007).*

These two definitions agree that a manuscript is written by hand and/or typed. In addition, a primary draft for printing and publishing, such as a book draft or an article submitted for publishing, is considered to be a manuscript. Furthermore, a manuscript may not necessarily be in book form; it can be an article, sheet of music, or it might be an archival document.

Therefore, the ALA Glossary of Library and Information Science defines a manuscript in the following terms: *"1. A work written by hand. 2. The handwritten copy of an author's work before it is printed; or, loosely, the author's typescript… " (Young and Belanger, 1983).* The term "manuscript", according to the preceding three definitions, is broad enough to include a variety of media and forms, such as letters, correspondence, diaries, music, legal papers, and manuscript books, from both contemporary and historical sources. It should be borne in mind that the above agreements all come from the LIS discipline, which exists in Western literature. With regard to the Arabic concept of a manuscript, this is defined as a handwritten book that was produced before the invention of printing(Harun, 1965; Halwaji, 1989). In fact, this

concept is supported by Western literature and perspective. Déroche et al define a manuscript as "a book 'manually inscribed', written by hand" (Déroche et al., 2006). He justified the appearance of the term "manuscript" as a result of the invention of printing, when books were no longer copied by hand (Déroche et al., 2006). Moreover, the ALA glossary gives a definition of a manuscript, as well as a separate definition of a 'Manuscript Book', which is:

> *"A handwritten book, as distinguished from a handwritten letter, paper, or other document; particularly, one before or at the time of the introduction of printing"* (Young and Belanger, 1983).

With regard to the historical context, a number of studies mention the introduction of printing (Halwaji, 1989; Fadli, 1990; Déroche et al., 2006). However, the "variation of print introduction time from one country to another" (Al-Showaish, 2000) should be taken into account. For example, the introduction of printing in the KSA occurred in the late nineteenth century (1883) (Sa`Ati, 1998), whereas in some parts of the Arab world it occurred prior to this date. For example, the introduction of printing in Egypt began at the end of the eighteenth century. According to this limiting factor in the definition of a manuscript, some Arabic documents which were inscribed after the introduction of printing (for example, after the nineteenth century in the KSA) are excluded. These Arabic documents are, however, still treated as manuscripts from the perspective of librarians, archivists, and users (i.e. scholars, researchers), and even, according to the Arab viewpoint, as historical documents. Nevertheless, taking the introduction of printing

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as a starting-point for defining and identifying Arabic manuscripts may not be entirely satisfactory. It may be more accurate instead to consider the boundaries of the spread of printing in each country, taking into account the variations in each country. As previously stated, for example, the introduction of printing in the KSA occurred before the reformation of the third Saudi state government (1902-present), with the first printing press in Hijjaz state (in the west of the Arabian Peninsula) in Makkah Al-Mukaramh in 1300AH (1883AD)[4]. However, the popularity of printing in the KSA spread at a later date (1327AH[5]-1909AD) through the establishment of printing presses in different parts of the country (Sa`Ati, 1998).

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[4] During this time Hijjaz state was under the authority of Ottoman Empire (1517-1914).
[5] This is an acronym of (anno hegirea) Hijri Year which is Islamic calendar. The first Hijri year was in 622 CE, when Prophet Muhammad (Peace Be Upon Him) immigrated from Makkah to Al Madinah.
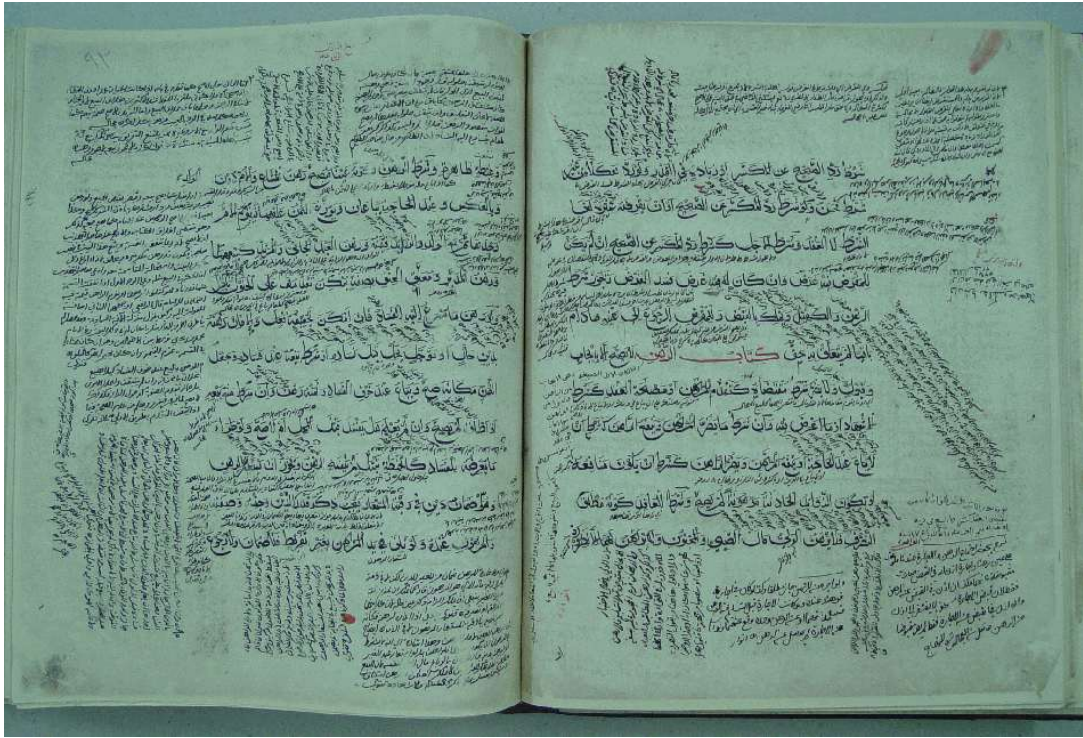
**Figure 2-1: An old Arabic manuscript (Image)**

The definition of manuscript used in this study is not restricted to the original author's handwritten manuscript (autograph); it also includes handwritten copied manuscripts − for example, a manuscript that was copied by a copyist or by the author's students (apograph). It is well-known that manuscript copying by copyists and craftsmen calligraphers has played a significant role in the writing of manuscripts, especially Arabic and Islamic manuscripts, before the invention of printing (Sayyid, 1997; Samarrai, 2001; Halwaji, 2002; Déroche et al., 2006). The medium of the manuscript may be parchment, papyrus, or old paper. Modern media, such as microform and/or digital formats which contain manuscript images, are considered by users, librarians, and archivists as

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surrogates of an original manuscript form and treated as manuscript in term of the medium content. (Sa`D and Majdhub, 1993) include manuscripts copied onto different media in their definition of manuscript: *"...copied the original copy either by hand or by other means such as microfilm which has not been printed yet"*. Hence, as a user may utilise a scanned manuscript for his/her research, it is unsurprising that librarians provide them with these surrogates.

In conclusion, the term "manuscript" has different definitions, depending on cultural viewpoint and discipline. The definition that is taken in this study is inspired by that of Déroche et al (2006); that is, "a book manually inscribed by hand" before the introduction of printing. An Arabic manuscript refers to a manuscript written in the Arabic language. The abbreviation for manuscript is ms (single), and mss (plural) (Young and Belanger, 1983).

## 2.2 History and Holdings of Arabic Manuscripts

Many researchers refer to the appearance of Arabic manuscripts as dating back to the beginning of Islamic civilisation in the seventh century AD; the first known Arabic manuscript book was the Holy Quran (Halwaji, 1989; Déroche et al., 2006; Sezgin, 1991a). The Holy Quran was written by the companions of the Prophet Muhammad (peace be upon him) (Halwaji, 1989). Many libraries in different parts of the world preserve collections of Arabic manuscripts, and some hold Holy Quran manuscripts or fragments dating back to the beginning of Islamic civilisation, such as Leiden University

Library, Chester Beatty Library, Princeton University Library, Cambridge University Library, and Bibliotheca Alexandrina, and many libraries hold unique Arabic manuscripts. Saifullah et al (2010) have reported the earliest Holy Quran manuscripts as dating back to the first century of Islamic civilisation (mid-seventh century), using radiocarbon techniques to examine some of earliest manuscripts that have been reported by palaeographers. One example is the Al-Walid manuscript from Sana (Yemen), entitled "Great Umayyad Qur'an" (Figure 2-2), which has been examined and the results cited by (Saifullah et al., 2010) as follows:

*The Great Umayyad Qur'an or the al-Walīd Manuscript from Dār al-Makhṭūtāt, Ṣanā, Yemen, is carbon-dated to between 657 and 690 CE. Using palaeography, ornamentation and illumination, H-C. Graf von Bothmer dated it to the last decade of the 1st century of hijra, around 710–715 CE, in the reign of the Umayyad caliph al-Walīd. Folios from a monumental Qur'anic manuscript in kufic script on vellum attributed to Caliph Uthmān with a size of approximately 55 cm x 70 cm were auctioned by Christie's (London) in 1992 and 1993. The carbon-dating of this manuscript was carried out at Oxford, the results of which show a 68% probability of a date between 640 CE and 765 CE, and a 95% probability of a date between 595 CE and 855 CE".*
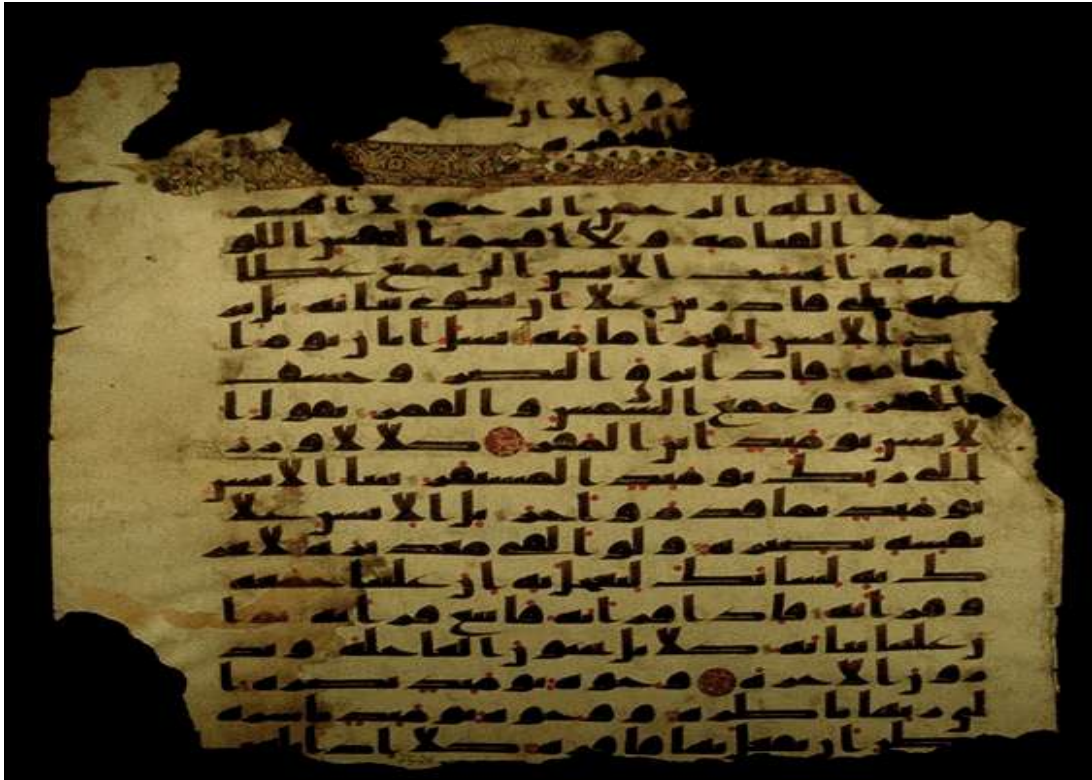
**Figure 2-2: Great Umayyad Qur'an. Adopted from Islamic Awareness website (Image)**

It is enough to know that thousands of Arabic manuscripts are held in many libraries, museums, and archive centres around the world. This diaspora of Arabic manuscripts could be a result of the breadth of the spread of Islamic civilisation from the Far East to the West. Crane (2002) mentioned that transmission of knowledge from one culture to another leads to the dispersal of the source of the knowledge (e.g. manuscripts). Arabic manuscripts contain knowledge of Islamic civilisation as well as of previous civilisations. Therefore, Arabic manuscripts have become worthy of attention for scholarly study and preservation in different parts of the world, as they are considered to be containers and transmitters of human knowledge  (Said, 2003).

Trading of Arabic manuscripts, as antiques and for their valuable content, is one of the reasons for this scattering of Arabic manuscripts around the world. Many Arabic manuscripts are found in antique markets and at auctions for sale. It is not surprising to find that Arabic manuscripts are sold for thousands of pounds or more. For example, a Holy Quran manuscript (Figure 2-3) was sold on 23rd October 2007 at the London auction house for £1,140,500 (USD $2,321,770); this manuscript was written in 1203 AD (17 Ramadan 599 AH)6. Currently, online auctions, such as Griffon.net, ebay, etc, offer Arabic manuscripts for sale.



**Figure 2-3: A Holy Quran manuscript sold by Christie's Auctioneers (Image)**

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[6] Record for the most expensive Quran in the world, set by the oldest copy. World Records Academy. Available at:
http://www.worldrecordsacademy.org/business/most_expensive_Koran_world_record_set_by_oldest_copy_70890.htm . Last access 05-Sep-2011.

Travellers, missioners, Orientalists and adventurers have contributed in transferring Arabic manuscripts from place to place, whether by selling or purchasing (Aldieb, 1986; Halwaji, 1989; Said, 2003). For example, Alphonse Mingana (1878-1937) was a traveller and Orientalist who was interested in Arabic and other Eastern manuscripts (e.g. Persian, Turkish).

> *"He made several journeys to the Middle East in the 1920s in search of manuscripts, financed by Edward Cadbury. In 1932, he returned to Birmingham to work as Curator of these manuscripts named after him, the Mingana Collection."*(University of Birmingham, 2006).

Some of the Mingana collection is available online via Virtual Manuscript Room, established by University of Birmingham and founded by JISC (http://www.vmr.bham.ac.uk/).

The precise number of Arabic manuscripts in existence is not known (Brockelmann, 1967; Sezgin, 1991b; Roper, 1992). Le Bourgeois and Kaileh (2004) have estimated the total number of known Arabic manuscripts around the world at roughly three million, but estimating the total number of Arabic manuscripts may not be feasible in the light of the lack of bibliographic control. A number of studies have confirmed this issue of lack of bibliographic control over Arabic manuscripts in different parts of the world, especially in cataloguing Arabic manuscripts (Awwad, 1984; Sa`Ati, 1993; O'keefe, 2000; Kulayb et al., 2006). Many countries have attempted to control their Arabic manuscripts, whether shelved or otherwise held, by producing catalogues or

handlists. Arabic manuscripts in the UK, for instance, are located in libraries, archive centres, museums, academic departments, etc. Table 2-1 shows Arabic manuscript collections at some UK institutions (i.e. providers). The data was gathered and analysed based on providers' catalogues, handlists and reports. The holdings of Arabic manuscripts in KSA in places of study are described later in the chapter.

**Table 2-1: Number of Arabic Manuscripts in UK libraries**

| City | Name of Library | Status | No. of AMSs |
|---|---|---|---|
| **Birmingham** | Selly Oak College, Birmingham University | University Library | 2,288 |
| **Cambridge** | Cambridge University Library | University Library | 1910 |
| **Durham** | Durham University Library | University Library | 28 |
| **Edinburgh** | Edinburgh University Library | University Library | 131 |
| **Edinburgh** | National Library of Scotland | National Library | 8 |
| **Glasgow** | Glasgow University Library | University Library | 85 |
| **Leeds** | University of Leeds: Brotherton Library | University Library | 376 |
| **London** | British Library: Oriental and India Office Collections | National Library | 10,600 |
| **London** | Institute of Ismaili Studies Library | Private research institute | 800 |
| **London** | School of Oriental and African Studies (SOAS) Library | Academic Library: Part of the University of London | 400 |
| **London** | Wellcom Institute for the History of Medicine | Research Institute | 600 |
| **Manchester** | John Rylands University Library | University Library | 868 |
| **Oxford** | Bodleian Library | University Library | 2,350 |
| **Total** | | | **18166** |

## 2.3 Importance of Arabic Manuscripts

The importance of Arabic manuscripts can be recognised by their physical and contextual features. Arabic manuscripts have unique physical characteristics that make them valuable as historical materials. These characteristics include decoration, illustrations, calligraphy, bookbinding, page layout, gilding (Figure 2-4), and so forth.
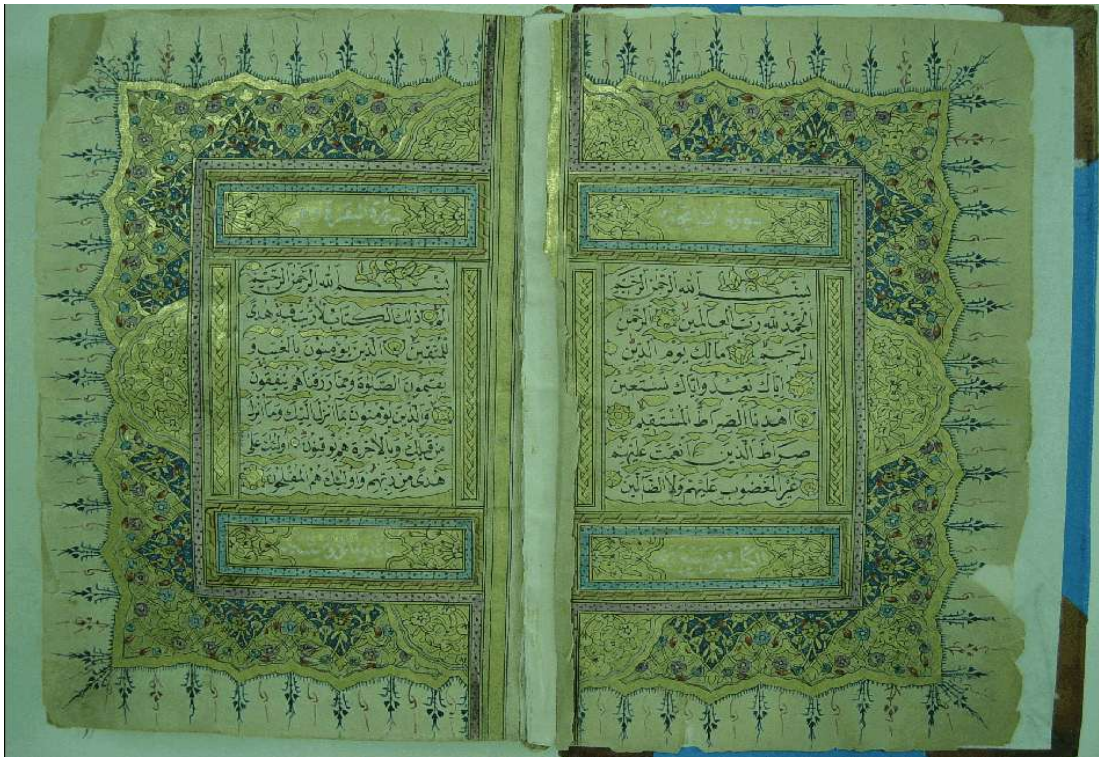


**Figure 2-4: The Holy Quran Manuscript, Gilding Pages (Image)**

Déroche et al (2006) present a number of these features and characteristics, reporting that many of these characteristics have received attention from scholars, researchers, students, and individuals (Déroche et al., 2006), and Mahasini (2001) has studied some of the illustrations that exist in certain Arabic manuscripts, finding that

illustrations form a valuable part of the manuscripts, as they give the reader and researcher non-textual information. She emphasised that illustrations should be studied and published (Mahasini, 2001).

As previously mentioned, Arabic manuscripts are held in different places (e.g. libraries, museums, archive centres), while there are also some Arabic manuscripts available on the market for trade. It should not be forgotten that many Arabic manuscripts are devoted to the field of religion, particularly Islam; therefore, Arabic manuscripts are also regarded by some as sacred treasures. Hence, Arabic manuscripts are seen as priceless by many people.

In terms of the contents of Arabic manuscripts, these form part of mankind's heritage, which should be preserved, organised and made accessible to users. This preservation and facilitation of Arabic manuscripts is not restricted to keeping them shelved in libraries; they should be available for seekers of "...all knowledge and trustful information" (Halwaji, 2002). Many scientific fields still rely on this heritage as a fundamental source of knowledge (Abdaljabbar, 2006). Huff (2003) stated:

> *"In virtually every field of endeavour – in astronomy, alchemy, mathematics, medicine, optics, and so forth –Arabic scientists (that is, Middle Eastern individuals primarily using the Arabic language but including Arabs, Iranians, Christians, Jews, and others) were in the forefront of scientific advance".*

Therefore, the content of Arabic manuscripts should be reproduced, both for the academic community and for the wider public. Reproducing (editing) this content is the theoretical and practical aim of the Arabic Heritage Revival movement (Harun, 1965; Munajjid, 1987). Therefore, academic institutions have been authorised to research and reproduce this content under scientific and controlled conditions[7]. A number of universities around the world have given attention to Arabic manuscripts through awarding academic degrees in Arabic and Islamic studies, and the study and editing of Arabic manuscripts are among their interests and goals. Taking the UK as an example, bibliographic data of 860 theses are available via the Index to Theses in Islamic Studies from 1997 to 2006 (Auchterlonie and Abu-Zayed, 2008).

Between 1970 and 1989, 787 higher academic degrees were awarded by universities in the KSA for editing Arabic manuscripts by searching and analysing the bibliographic database of King Faisal Centre Research and Islamic Studies. Abdaljabbar (2006), in her research on publishing Arabic manuscripts, reported that this figure had doubled within the following ten years (i.e. from 1989 to 2000). There are five universities in the KSA that grant higher academic degrees in editing Arabic manuscripts. The majority of degrees awarded are in the fields of Humanities and Arts, with the greatest concentration in religious studies, Arabic language and literature, and history. Up to 2000, (208) works on Arabic manuscripts were published in book form by the five

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[7] For further reading about the scientific rules for reproducing Arabic manuscripts in academia, see: The Rules of Editing Manuscripts, by Al-Munajjid, S. Jeddah: Dār al-Kitāb al-Jadīd, (1982). PDF copy @ http://ia600700.us.archive.org/12/items/waq12767/12767.pdf. Directory of Writing Thesis and Dissertation at King Abdulaziz University. By King Abdulaziz University (KAU), Research Committee. Jeddah: KAU, (2008).

universities (Abdaljabbar, 2006). Forty-four of these books were academic theses or dissertations.

An Arabic manuscript is still valuable to manuscriptologists even if it has been edited or published. It may be re-edited under certain circumstances which are agreed in academia; for instance, if a new copy has appeared which contains valuable information to be re-edited (Harun, 1965; Munajjid, 1987; Samarrai, 2001). Abdaljabbar (2006) counted 23 re-edited Arabic manuscripts in the five universities, and she reported some of the reasons for the re-editing of these manuscripts, which are stated in the introductions of the newly-edited texts. For example, re-editing was necessary due to the appearance of a new copy of an existing manuscript which had not been taken into account by the previous editors, and which contains valuable information (Abdaljabbar, 2006).

## 2.4 Characteristics of Arabic Manuscripts

Arabic manuscripts have received attention from researchers and scholars for study and research purposes. Without doubt, librarians and archivists need to protect this resource by preserving, organising, and making it accessible. In this section, some of contextual and physical characteristics of Arabic manuscripts are addressed. Moreover, an example of an Arabic manuscript title (i.e. work) is used for demonstration purposes: *Sahih Al-Bukhari*.

*Sahih Al-Bukhari* is a book that provided the main means of gathering Ahadith[8], the statements and actions that met with tacit approval of the Prophet Muhammad (peace be upon him), which were narrated in a truthful manner. *Sahih Al-Bukhari* is considered to be the second book of Muslim thought, after the Holy Quran. Muslims agree that the Hadith (Tradition)[9] "is the second of the two revealed fundamental sources of Islam, after the Glorious Qur'an" (Islamic Awareness, 2011). Sunnah is used as a synonym for Hadith. *Sahih Al-Bukhari* is considered to be a principal source of the science of Hadith (Brockelmann, 1967; Sezgin, 1991a). It was written by Muhammad Ibn Ismail Ibn Ibrahim Ibn al-Mughirah Ibn Bardizbah al-Bukhari al-Juafi (196-256AH/810-870AD), whose popular name is Imam Bukhari (Sezgin, 1991a). The work was published in nine volumes and contains 7,563 Hadith (Alhassani, 1990). It was translated into the English language by Muhammed Muhsin Khan and published by Darussalam Publishing and Disruption in 1997 under the title "*Ṣaḥiḥ al-Bukhari*: the translation of the meanings of *Sahih al-Bukhari*: Arabic-English"[10]. The creation of the content and the most significant characteristics and features of Arabic manuscripts are addressed in the following section.

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[8] *Ahadith* is the plural of *Hadith*.
[9] For further reading about Hadith Science: Traditions of Islam: An Introduction to the Study of the Hadith Literature By Alfred Guillaume, An Introduction to the Hadith, By Burton, J., An Introduction To The Science Of Hadith, By Islamic Awareness.
[10] *Sahih Al-Bukhari* was published online and can be accessed via USC Center for Muslim and Jewish Engagement @: http://www.cmje.org/religious-texts/hadith/bukhari/ .

## 2.4.1 Creation of Content in Arabic Manuscripts

The content of an Arabic manuscript was created by the original manuscript author (i.e. autographer), and/or by the copying of the manuscript by a copyist (i.e. apographer), of whom some were professional craftsmen, whereas others, for example, were students (Déroche et al., 2006). Autograph does not necessarily mean having been handwritten by the main author. There were various approaches to the writing of the content of a manuscript (i.e. work). Halwaji (1989), in his study: "Arabic manuscripts from the beginning until the 11th Century", states that the two methods were: 1. Handwritten by the author; 2. Dictation by the author to a student (Halwaji, 1989). These approaches were very popular for writing Arabic manuscripts ((Harun, 1965; Nabhan, 1993; Sa`D and Majdhub, 1993). Nabhan (1993) adds a third approach, which is narration; for instance, when a student rewrites what he/she has memorised from his/her lesson on a manuscript. The written manuscript was attributed to the main author (e.g. author, teacher, or lecturer), because he/she was responsible for the content. Therefore, for any given work, there could be more than one "copy", written by, for example, students, or even by the main author.

This may lead to variations between the manuscript copies written by different individuals (i.e. author, student and copyist). Sahih Albukhari, as an example, was written by the dictation and narration approaches. However, there were controls in place to preserve the manuscript's content from mistakes, missing words, and the like. A manuscript which was written using the second or third method was usually reviewed by

the main author. Therefore, the manuscript can be said to have existed in draft form before it was reviewed by the main author. After reviewing the draft, a new manuscript would be produced in most cases, or the draft manuscript could remain, with the comments or corrections. These commented manuscripts are addressed later in this chapter.

The process or review and revision of an Arabic manuscript is called Alarzah (Harun, 1965; Binabin and Tubi, 2003). It is commonly stated of this type of manuscript that it has been shown to and reviewed by the main author, and this information is located on the title page, introduction, or colophon of the manuscript. This may include a work that has been written within a manuscript, for instance, in the main author's handwriting, as a final draft (Figure 2-5). If the main author has made amendments to this work, such as adding new content or correcting, this is close to the modern meaning of editing and is called *Alebrazh* in Arabic manuscripts (Nabhan, 1993; Bergstrnsser and Bakri, 1995; Binabin and Tubi, 2003). There are many works within Arabic manuscripts that have a number of editions, such as *Sahih Al-bukhari*, which was dictated for 23 years to *Al-Bukhari's* students. The content of Arabic manuscripts has some attributes which can be noted among works via authorship.
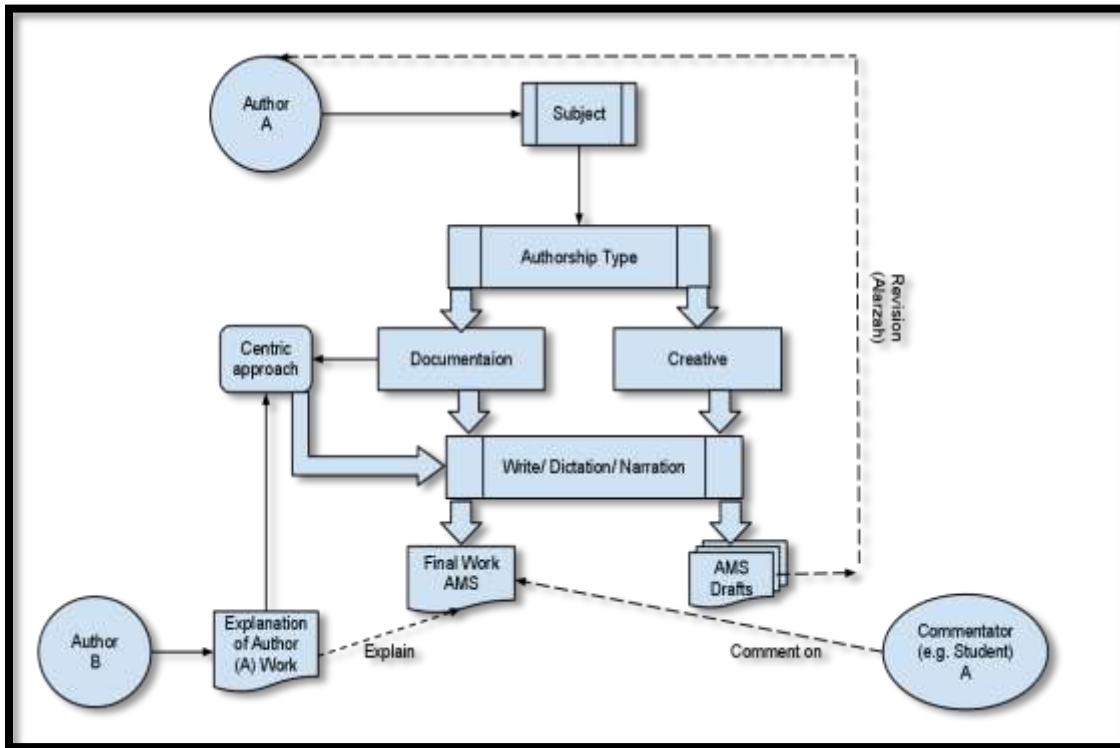
**Figure 2-5: Model of Creation of Content in Arabic Manuscripts**

## 2.4.2 Authorship in Arabic Manuscripts

Authorship in Arabic culture – particularly its written heritage – should be demonstrated in order to draw a conceptual model for organising Arabic manuscripts. Within this context, authorship constitutes a formal and organised text in book form (codex), designed to be read, studied, and/or taught. Authorship in Arabic manuscripts can be categorised into two types (Figure 2-6), according to source:

- Creative Authorship: A work that does not rely on previously-cited works or expressions of those works, and can clearly be distinguished by literary genre (i.e.

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novels, poems, plays, etc.); the presence of cited sources in such works is not necessarily a core component of the text.

- Documentation Authorship: A work whose content is dependent on previous work(s). This type of writing derives its core content from other sources for the purpose of scholarly communication.
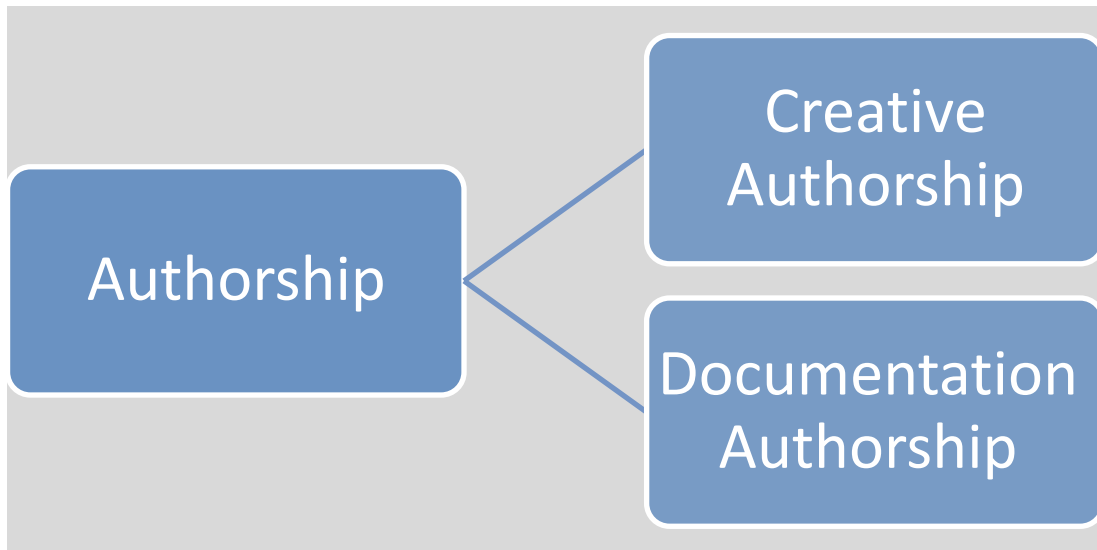


**Figure 2-6: Authorship Types**

This latter form of authorship is primarily based on, or is derived from, work(s) or text(s) that are cited. Documentation authorship is based on a variety of works, texts, and/or sources that have been cited or quoted to create its content. This type of work includes, for instance, monographs, annual reviews (in certain fields), academic articles, and so forth. This type uses literary authority to demonstrate previous efforts, works, and results of the works' content (Nabhan, 1993).

Nabhan (1993) reports in his study that there is a sub-category of documentation in Arabic manuscripts is known as the centric approach, which refers to writing about a specific text (i.e. Centric Work – CW), whether through completion, explaining (exegesis), summarising, responding, correcting, commenting, expanding, indexing, or studying (Figure 2-7) to create a Generated Work (GW). Whichever method is used, a specific text is taken as the main purpose or subject of authorship (Nabhan, 1993). This is a popular authorship approach among Arabic manuscripts, and *Sahih Al-Bukhari* (i.e. CW) can be used as an example of this.
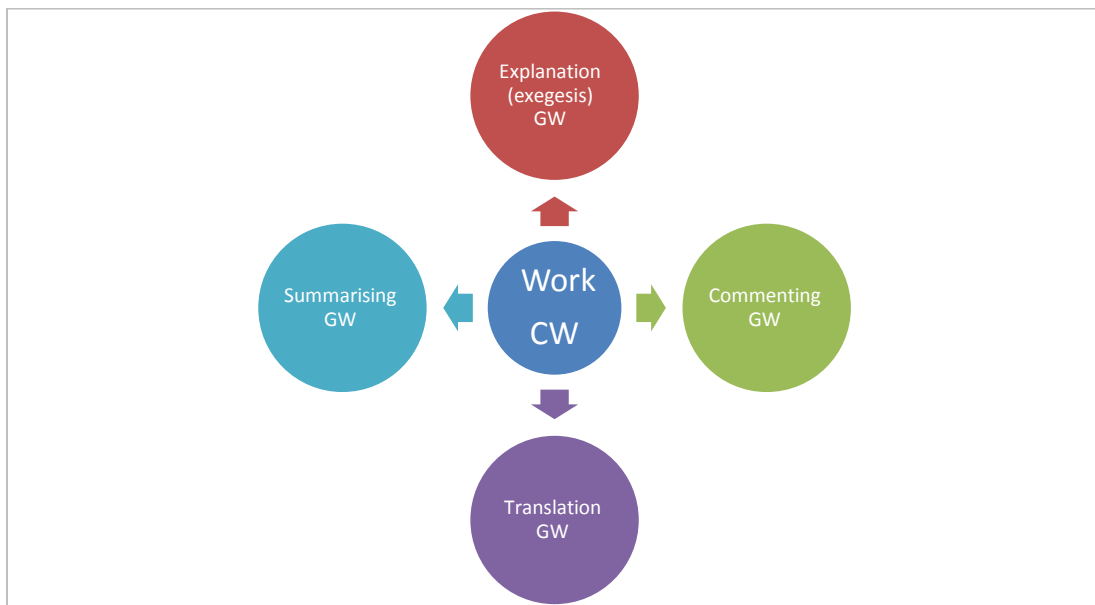


**Figure 2-7: Centric Authorship**

Sezgin (1991) reports that roughly 56 works have been written to explain *Sahih Al-Bukhari* (CW), whereas Alkutheer (2009) cites over 80 works of the same nature

(Alkutheer, 2009). Furthermore, Alhassani argues that over 370 scholars have dealt with *Sahih Al-Bukhari*, and that some of these scholars may have written more than five works each (Alhassani, 1990). The following are some of the works that have used *Sahih Al-bukhari* as a core of authorship:

1. *Al-Kawkab al-Darari fi Sharh Al-Bukhari* by *Muhammad al-Kirmani* (died: 786AH-1384AD) (GW).

2. *Fath Ul-Bari fi Sharh Sahih al-Bukhari* by *al-Hafith Ibn Hajar Al-Asqlani* (died: 852AH-1448AD) (GW).

3. *Al-Tanqih La-Alfath Al-Jama Al-Sahih* by *Muhammed al-Zarkashi* (died: 794AH-1392AD) (GW).

4. *Irshad al-Sari li Sharh Sahih al-Bukhari* by *Ahmed Muhammad al-Qastalani* (died: 923AH-1517AD) (GW).

5. *Umdah al Qari fi Sharh Sahih al Bukhari'* by *Badr al-Din al-Ayni* (died: 855AH-1448AD) (GW).

6. *Tuhfat Al-Bari be-sharh Sahih al-Bukhari* by *Zakria Al-Ansari* (died: 916AH-1511AD) (GW).

Some works appeared after *Sahih Al-Bukhari* as explanations, summaries, compilations, sequel, indexes, etc. Some of the abovementioned works may have been copied into more than one manuscript by copyists, for instance, but they are considered to be the same work in different "copies", and/or "editions". For instance, *Fath ul-Bari fi Sharh Sahih al-Bukhari* by *al-Hafith Ibn Hajar Al-Asqlani* as a generated work (GW) exists in 60 manuscript copies, some of which are thought to have been written by the

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main author (*al-Hafith Ibn Hajar Al-Asqlani*) (Sezgin, 1991a) and some by copyists[11]. These manuscripts are scattered in many libraries in different parts of the world, including UK, Germany, Turkey, Egypt, Indonesia, Tunisia, USA, KSA, etc. (Sezgin, 1991a).

In summary, documentation authorship refers to taking a number of works and integrating them into a type of compendium; in other words, many become one. Conversely, the centric approach takes one work as the centre or core from which a number of other works stem.

Nabhan (1993) studied the relationship between the texts of certain Arabic manuscripts by applying bibliographic analysis and bibliometrics to the selected Arabic manuscript samples (Nabhan, 1993). Through this process, he attempted to represent the relationship between the works of different authors of Arabic manuscripts in terms of the way that information is created through centric authorship, and the effect of chronology. The aim is to position a work within its community or family. As such, Nabhan (1993) introduced a bibliogram[12] as a model to present the relationship of a work with other works. In addition, he used a biblio-chronogram to measure the way in which chronology affects the work.

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[11] To for more information about the role of copyists and craftsmen in copying Arabic manuscripts, we recommend reading " Islamic codicology: an introduction to the study of manuscripts in Arabic script" by Déroche, F., Berthier, A., & Waley, M. I. (2006).

[12] From a web search, it was found that the bibliogram was introduced by Howard D. White (2005): *On Extending Informetrics: An Opinion Paper*. In: Proceedings of the 10th International Congress of the International Society for Scientometrics and Informetrics. Stockholm p. 442-449. Nabhan coined this term with regard to a subject bibliography, while White focused on noun phrases in the text. The initial appearance of the bibliogram in the literature was in Sawin, L Nilon, C. H., Clark, R., (1965). *The integration, storage and retrieval of bibliographic data in English studies*: University of Colorado.

Nabhan (1993) defines a bibliogram (from *biblio*: book; and *gram*: diagram) as "a bibliographic diagram to present the relationship between works." A bibliogram can describe the relationships between the following:

- Two complete works

- A complete work and a partial work

- Two partial works

The relationship between works can be classified into levels and sublevels according to the degree of focus on the original text, with regard to the centric approach and generated works. Figure 2-8 shows the relationship between works and the extent of the focus on the original work (e.g. *Sahih Al-Bukhari*) as a tree classification.
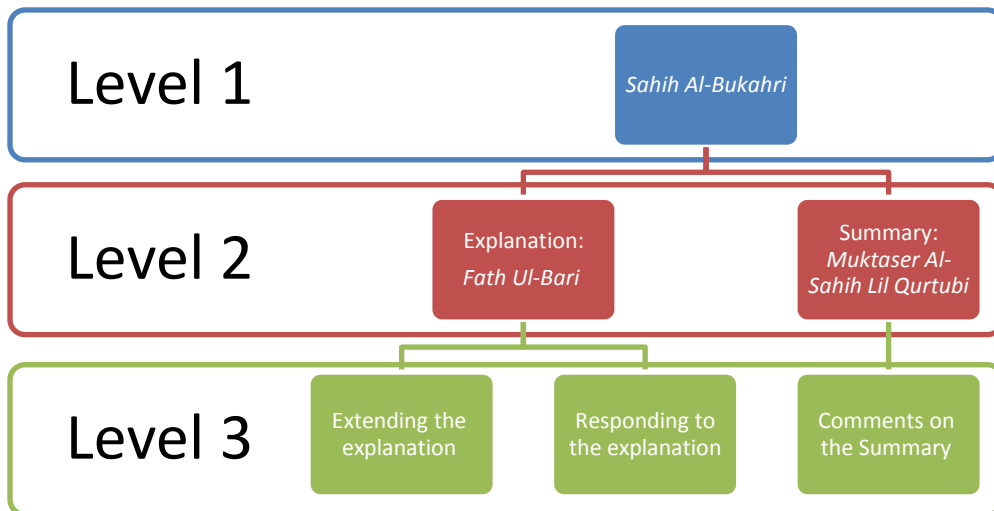


**Figure 2-8: Relationship Tree for** *Sahih Al-Bukhari*

As illustrated in Figure 2-8, works can continue to be generated; for instance, Comments on the *Muktaser Al-Sahih Lil Qurtubi* at Level Three has a responding work

as a fourth level. In addition, a generated work (GW) can become a centric work (CW) if another work makes use of it as a centre for authorship; this is demonstrated in Figure 2-8. Level 3 represents generated works (GWs) of Level 2 texts which have become centric works (CWs). Creating a relationship between works in Arabic manuscripts can occur according to authorship approaches and the level at which the main work is generated.

A biblio-chronogram, which focuses on the chronological factor of the generated work in relation to the main work, can indicate the span of a work's influence. Moreover, a biblio-chronogram can be useful to determine the timespan of generated works (Nabhan, 1993). A biblio-chronogram could reveal valuable data that may not be mentioned in the resources. For instance, an increasing number of authors around a centric work at a specific time could indicate that great attention was paid to that work. This in turn could give an insight into the scholarly communication and culture of that period.

An example is given for analysing the content of one of the main bibliographic works of Arabic manuscripts; *Tarikh al-turath al-`Arabi* (History of Arabic Heritage) (Geschichte der Arabischen Schrifttums) by Fuat Sezgin (born 1924) 13 Volumes (page no p.56). *Sahih Al-Bukhari* was taken as a centric work (CW), and the generated works (GWs) of *Sahih Al-Bukhari* have been tracked according to the timespan, as follows:

**Table 2-2: Biblio-chronogram of *Sahih Al-Bukhari***

| Sahih Al-Bukhari. Authored in 9th century | | | | | |
|---|---|---|---|---|---|
| **Century AD** | Explanation (Exegesis) | Summarising | Completing | Total | % |
| **10th** | 4 | 2 | - | 6 | 8.6% |
| **11th** | 2 | 1 | - | 3 | 4.3% |
| **12th** | 2 | 2 | - | 4 | 5.7% |
| **13th** | 2 | 4 | 1 | 7 | 10.0% |
| **14th** | 5 | 3 | - | 8 | 11.4% |
| **15th** | 16 | 1 | 2 | 19 | 27.1% |
| **16th** | 8 | - | - | 8 | 11.4% |
| **17th** | 3 | - | 2 | 5 | 7.1% |
| **18th** | 7 | 1 | - | 8 | 11.4% |
| **19th** | 1 | - | 1 | 2 | 2.9% |
| **Total** | 50 | 14 | 6 | 70 | 100% |

As demonstrated in Table 2-1, *Sahih Al-Bukhari* has been taken as centric work for ten centuries. There are 70 generated dated works cited at History of Arabic Heritage bibliography. Some generated works have not been dated in the History of Arabic Heritage, and have therefore been excluded from the above analysis. This is because these generated works are in manuscript form and the date of writing has not been identified.

It can be observed that the greatest number of works were generated in the second half of the second millennium, especially during the fifteenth century (no=19, %=27.1). This information could be of use to scholars, researchers, and/or students when

determining the status of the scholarly culture and environment that participated in the abundance of authorship in that period.

### 2.4.3 Commented Arabic Manuscripts

In order to complete the discussion about the authorship of Arabic manuscripts in general, and specifically centric-type (Page 38), commented Arabic manuscripts are discussed as a pattern of centric authorship in Arabic manuscripts (Binabin and Tubi, 2003; Nabhan, 1993; Mashukhi, 1994). However, this pattern is based on creating the content (GW) within the same medium as the CW (i.e. the main text − *matn*) through commented scripts. The term 'commented Arabic manuscript' refers to any manuscript containing comments surrounding the main text (*matn*), regardless of the purpose or form of the comments.

Unsurprisingly, there were purposes behind and regulations concerning the writing of comments on Arabic manuscripts. Authors and copyists were required to leave enough space surrounding the *matn* for binding or adding comments.

It is possible to identify a set of common purposes of comments that were well-known and taken into account by authors and commentators. Mashukhi (1994) lists some of the purposes of comments: following the *matn* with critical points, explanation (exegesis), completion, correction, or decoration. Additionally, comments could be for the purpose of linking ideas from different resources, or summarising (Nabhan, 1993). Comments can therefore be divided into two forms, as follows:

1.  Writing a separate book: A commentator was often compelled to write a separate book, which included the original text and the comments in his/her centric approach of authorship, such as *Fath al-bari sharh Sahih al-Bukhari* by Ibn Hajr Al-'Asqalani. This work is an explanation of *Sahih Al-Bukhari*. A distinction should be made between the original text and comments by either using a different colour, or using a specific word referring to the original text, such as writing before the original text "said قال", referring to the original author's text (Khalifah, 1992; Nabhan, 1993).

2.  Merged comments: This method was used by many editors, students and authors. This approach was based on writing comments surrounding the *matn*, or between lines. It was common to add defined marks or signs to illustrate the position of the comment in the *matn*. These marks or signs were also used to clarify the purposes of the comments (Halwaji, 1989) (Figure 2-9).

Comments could be made by the author of the *matn*, the author's students, the author's followers, the author's opponents, the ordinary reader, or even a combination of these (Nabhan, 1993). An example of generating merged comments in an Arabic manuscript (AMS1) is shown below:

- Author A ---------- writes--------- AMS1 *matn*,
- Author B --------- explains surrounding -------AMS1 *matn*,
- Student 1 of Author B ------ comments surrounding ------- explanation of AMS1 *matn*, etc.

Therefore, it can be argued that there was more than one creator of the commentaries on the content of Arabic manuscripts. These types of comments on the main text (*matn*) can be a part of the variorum (notes and commentaries by a number of commentators, editors, scholars, critics, etc.) editions.



**Figure 2-9: Sample of using words (شرح= explanation) or initials (ش) to clarify the purpose of a comment.**

### 2.4.3.1 Composite Arabic manuscripts

A composite manuscript is a subcategory of the commentary manuscript concept. This type of manuscript involves more than one creator, for example the main author of the *matn* and a different commentator. Comments in a composite manuscript can be made by different commentators (Figure 2-10).



**Figure 2-10: Hahiyat 'ala sharh Muhammed Bin Mubarkshah al-Bukhari 'ala Hikmat al-'ayn li-'Ali Bin 'Umar**

The location of comments in a composite manuscript can therefore be on a different part of the page. Examples of such locations are in margins, footnotes, or at the top of the page (Figure 2-11). Sometimes comments may be located between lines or on scraps of paper attached to the Arabic manuscript (Khalifah, 1992; Mashukhi, 1994). Comments can also be located at the beginning or the end of the Arabic manuscript (Mashukhi, 1994).
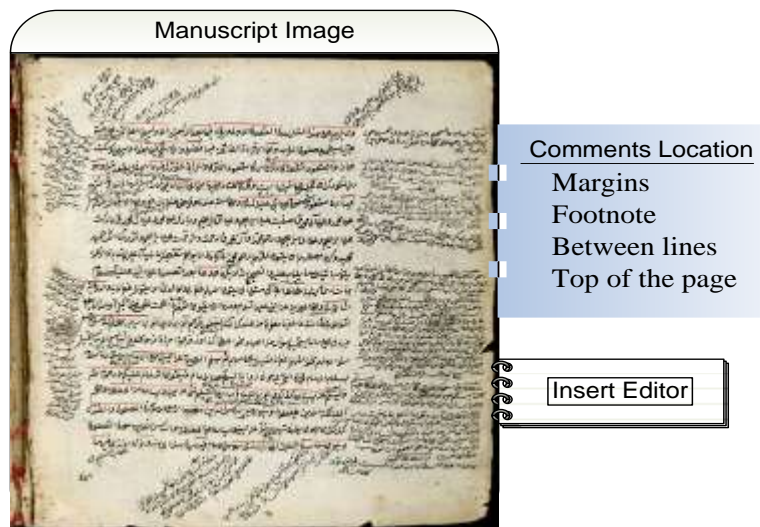


**Figure 2-11: Location of comments**

In some composite Arabic manuscripts, there are a variety of levels of comment; for example, comments that target the original comments on the *matn*; in other words, commented comments. Composite Arabic manuscripts can be categorised into three levels: the primary level, which refers to comments targeting the *matn*; the secondary level, which is that of comments targeting the comments on the *matn*; and the tertiary

level, which is that of all other comments targeting the comments made at the secondary level.

Comments are among the most reliable sources in editing and reading Arabic manuscripts (Harun, 1965), and can provide Arabic manuscript users with valuable information. These benefits, such as verification of the *matn*, finding out how the *matn* circulated among readers, and discovering the impact of the *matn* at different time periods, can be gleaned from the manuscript's commentaries (Mashukhi, 1994).

Commented Arabic manuscripts were an issue for indexing and cataloguing Arabic manuscripts. Mashukhi (1989) reported that commented Arabic manuscript is still treated as one object in cataloguing processes. Although, a commented Arabic manuscript may contain, for instance, several of different contents (e.g. composite manuscript), and/or authorship contributors. This diversity should be taking into account during indexing and cataloguing of Arabic manuscripts. There are number of issues related technical processes of Arabic manuscripts have been reported by number of studies (Awdah and Atmah, 1997; Awwad, 1984; Hafyan, 1998; Halwaji, 1989; Mashukhi, 1989). In the following, some of bibliographic works and cataloguing models of Arabic manuscripts is discussed through reviewing them and analysing their contents and comparing among them in order to figure out the related issues and suggesting a suitable solution.

## 2.5 Bibliographic Works and Cataloguing of Arabic manuscripts

There is no doubt that Arabic manuscripts have received considerable attention in terms of acquisition, preservation, organisation, and dissemination by many bodies such as libraries, museums, archives, governmental and private organisations, and even individuals. Technical processes, such as cataloguing, indexing, classification, etc, are involved in the keeping of Arabic manuscripts. These processes aim to provide users with valuable information about Arabic manuscripts from both their physical and textual aspects. Efforts to describe Arabic manuscripts physically and textually should also be mentioned. Perhaps the most significant efforts in indexing and cataloguing old Arabic and Persian manuscripts books is *Kitab al-Fihrist* by the bibliographer *Ibn Al-Nadim*, who died in 998 AD. The *Kitab al-Fihrist* is considered to be a bibliography of Arabic manuscripts and was intended to be an index of Arabic and Persian scholarly literature. This bibliography was followed by many others that sought to organise and give information on Arabic manuscripts, such as the *Kashf al-zunun `an asami al-kutub wa-al-funun*.

### 2.5.1 Bibliographic works of Arabic manuscripts

Hamadah (1987) provides a survey of bibliographic resources for Arabic manuscripts in his book "Arabic and Arabisation Resources", including 59 bibliographic works and 53 library catalogues. Hazimi (2001) studied old and new Arabic references in his bibliometric study, entitled "Arabic References: Analytical and Bibliometric Study". He noted 1,296 Arabic bibliographic works, including general and discipline-specific

works. There were sixty-two Arabic manuscript bibliographic works in Hazimi's (2001) study, and 291 library catalogues (Hazimi, 2001). The bibliographic works that are presented in this study is only a sample to show the early bibliographic works and following bibliographic Arabic manuscripts resources which have not geographical boundary, specific discipline, or particular author's works. It is worth mentioning that presenting and discussing the following bibliographic works has purposes in this study;

Reveal the bibliographic works approaches in organising their contents (i.e. Arabic manuscripts),

Assist in predicting the best practice in organising Arabic manuscripts in virtual environment (i.e. digital libraries), (see page101)

### *Kitab al-Fihrist (The Catalogue) by Abu'l-Faraj Muhammad bin Is'hāq Ibn al-Nadim (died 998 AD):*

This is the first known bibliographic work that surveyed, described and indexed Arabic manuscripts from the beginning of Islamic civilisation (between the mid-seventh century and the tenth century). This bibliography uses a classification system similar to the Dewey Decimal System (Stewart, 2007), and contains descriptions of Arabic manuscripts and biographies of manuscript authors. This information is classified as follows:

1. Scriptures of Muslims, Jews and Christians, with emphasis on the Quran and Quranic sciences

2. Grammar and Philology

3. History, Biography, Genealogy

4. Poetry

5. Scholastic Theology (*kalam*)

6. Law and Tradition

7. Philosophy and the Ancient Sciences

8. Legends, Fables, Magic, Conjuring

9. Doctrines of the Non-monotheistic Creeds

10. Alchemy

Contents are organised by subject, then authors' names (roughly 2200 names), then titles of Arabic manuscripts (over 8300 titles).

***Kashf al-zunūnan asāmi al-kutub wa al-funūn by Hajji Khalifah (Turkish historian, his name Kâtip Çelebi, died 1657)*** *((Encyclopædia Britannica, 2011):*

Manuscripts in this text (Khalifah, 1992) are arranged alphabetically according to discipline. Disciplines are arranged alphabetically as a main entry, followed by manuscript titles (Halwaji, 2004). This book does not provide full descriptions of manuscripts, particularly regarding the physical characteristics. However, it provides very rich information about the manuscripts' content and their relationship to other manuscripts (Nabhan, 1993).

*Tarikh al-adab al-Arabi (History of Arabic Literature) (Geschichte der Arabischen Litteratur) by Carl Brockelmann (German Semitics, died 1956):*

The content of Tarikh al-adab Al-arabi is arranged chronologically according to Arabic history. Disciplines are presented alphabetically, followed by authors of Arabic manuscripts in alphabetic order and titles of Arabic manuscripts (Brockelmann, 1967). This source covers all Arabic writers up to 1937. The location of a manuscript is reported, and one of the advantages of this bibliography is that it can lead a researcher to the location of a manuscript. However, Brockelmann excluded manuscripts by unknown authors, which are numerous (Halwaji, 1979).

*Tarikh al-turath al-`Arabi (History of Arabic Heritage) (Geschichte der Arabischen Schrifttums) by Fuat Sezgin (born 1924- ) 13 Volumes:*

Sezgin has arranged his bibliography according to discipline. Under each entry (discipline) there is an introduction to the discipline, followed by authors' names in alphabetical order; each author has a short biography. Under the authors' names are the titles of Arabic manuscripts presented according to the popularity of the work. Under each work, related works (e.g. summaries, abridgments, etc.) are presented and their physical location is given (Sezgin, 1991a). This bibliography names a place where a manuscript is kept and a recall number to identify them for retrieving. However, it is worth mentioning that many Arabic manuscripts have not been covered in this bibliography, which deals with manuscripts up to 1039 AD (Sezgin, 1991a). It is not intended to cover manuscripts written after this date.

*Tarikh al-turath al-`Arabi: Majmuaat al-Maktutat Al-Arabih fi Maktbat Al-Alam (History of Arabic Literature: Collections of Arabic Manuscripts in World Libraries) by Fuat Sezgin (born 1924- ):*

This work can be classified as a directory of Arabic manuscript catalogues worldwide. Sezgin covers approximately 100 countries that hold Arabic manuscripts and mentions roughly 1,700 catalogues, reports, articles, lists, and libraries. The content is arranged geographically by country name, then by city (Sezgin, 1991b).

*Worldwide survey of Islamic manuscripts, by Geoffrey Roper:*

This source deals with Arabic and non-Arabic manuscripts in 117 countries and provides details about the libraries, museums and archives that hold Islamic manuscripts. It was published in four volumes in 1991 by the Al-Furqan Islamic Heritage Foundation in London (Roper, 1992). (Halwaji, 2004) considered this directory to be one of the main resources for locating Arabic manuscripts.

After previewing the sample of bibliographic works that is interesting in Arabic manuscripts, their approaches to organising contents are summarised in the following figure:
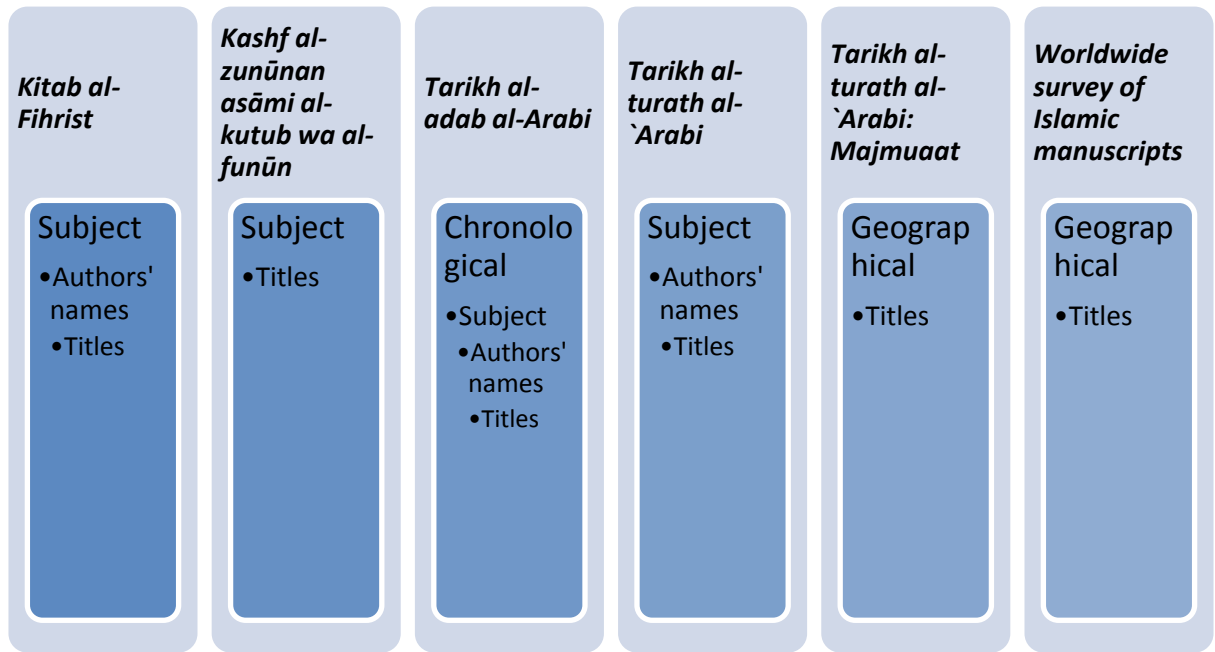
**Figure 2-12: Organising Methods in the Cited Bibliographic Works**

As shown in Figure 2-12, the content of the bibliographic works are organised under main entry (by: e.g. subject, chronology, geography). Some of the bibliographic works have their contents divided into between one and three sub-categories (e.g. titles, authors' names). This hierarchical division should taken into account in designing a digital library to browse and retrieve a manuscript, and in building a metadata schema to describe the manuscript physically and contextually. As this study aims to provide best practice for a digital library of Arabic manuscripts based on a user-centred approach, surveyed participants were asked to provide their preferred methods for retrieval and navigation of Arabic manuscript collections via a digital library (see page221) .

**2.5.2 Cataloguing of Arabic Manuscripts**

A number of studies have addressed the cataloguing of Arabic manuscripts from both the theoretical and practical approaches. The majority of these studies reported that cataloguing Arabic manuscripts is a difficult and expensive task (Awdah, & Atmah, 1997; Awwad, K., 1984b; Fattuhi, 1980; Hafyan, 1999; Halwaji, 1989; Kulayb et al., 2006; Mashukhi, 2001; Nasr, 2007; Roper, 1992; Samarrai, 2001), due to a number of issues and problems, whether regarding the manuscripts themselves or external resources. Issues regarding the manuscripts themselves include a lack of available bibliographic data in the manuscript; for example unknown author, title, or copying date. External resources refer to, for instance, a lack of cataloguing rules or lack of professional cataloguers. The lack of cataloguing rules for Arabic manuscripts is one of the most significant issues reported by many studies (Halwaji, 1989; Le Bourgeois & Kaileh, 2004; Mashukhi, 1989, 2001; Nasr, , 2007; Samarrai, 2001), and to date there are no unified standards or rules for describing and cataloguing Arabic manuscripts in most of the libraries that hold them. The majority of libraries rely on either a modification of one existing set of cataloguing rules (e.g. Anglo-American Cataloguing Rules, Second Edition AACR2, or MARC 21) or the adoption of previous individual cataloguing models (Hafyan, 1998; Halwaji, 1989; Nasr,, 2007). Some individual models have been developed by professionals to catalogue Arabic manuscripts. Four cataloguing models of Arabic manuscripts are as follows;

1. Catalogue of the Arabic manuscript collection at the Library of Congress, by Almunajed (1969),
2. Cataloguing Arabic manuscripts, by Fattuhi (1980),
3. Arabic manuscript, by Halwaji (1989),
4. Arabic Islamic palaeography and codicology by Samarrai (2001).

The individual cataloguing models above have been used at Arabic manuscript providers in the KSA (see page 154). These models have been analysed and classified by field, as follows;

- Bibliographic Data: This refers to data which describe the origin of a manuscript (e.g. statement of responsibility, titles, date, etc).
- Physical and Contextual Data (i.e. codicological Data): This refers to data which describe the physical appearance of a manuscript and content (e.g. size, number of pages/lines, scripts types/colours, incipit/explicit, subjects, etc.)
- Administrative Data: This refers to other data regarding the manuscript, such as surrogates, call no, cataloguer name/no, authentication access, etc.
- Authority files and references: These refer to data about resources and references that have reported on the manuscript, or/and author name and biography.
- Extra data: means any data that are not covered by the previous categories.

Table 2-3 will present the comparison among the four individual models.

**Table 2-3: Individual Models of Cataloguing Arabic Manuscripts.**

| Data | Almunajed, S (1969) | Fattuhi, M. A. (1980) | Halwaji, A. (1989) | Samarrai, Q. (2001) |
|---|---|---|---|---|
| **Bibliographic Data** | Title<br>Author's name and year of death<br>Copyist name<br>Copied date | Title<br>Author's name and year of death<br>Copyist name<br>Copied date/ place | Title<br>Author's name and year of death<br>Copyist name<br>Copied date | Title<br>Author's name and year of death<br>Copyist name<br>Copied date |
| **Codicological Data** | Incipit<br>Explicit<br>No. of pages, lines<br>Size<br>Script and ink<br>Type<br>Binding<br>Notes | Incipit<br>Explicit<br>No. of pages, lines<br>Size<br>Script and ink<br>Type<br>Binding<br>Notes | Incipit<br>Explicit<br>No. of pages, lines<br>Size<br>Script and ink type<br>Binding<br>Notes<br>Subject/s | Incipit<br>Explicit<br>No. of pages, lines<br>Size<br>Script and ink type<br>Binding<br>Notes |
| **Administrative Data** | Provenance<br>Surrogates<br>Call no.<br>Cataloguer sign | Provenance<br>Surrogates<br>Call no. | Provenance<br>Surrogates<br>Call no.<br>Cataloguer sign | Surrogates<br>Call no. |
| **Authority files and references** | References | References | References | References |
| **Extra data** | | Reporting other copy of MS if known by cataloguer, or mentioned in resources.<br>Reporting if it has been published if known. | | Reporting if it has been published or edited. |

Table 2-3 shows that the four models are fairly similar. However, some differences can be noted; for instance, Halwaji requires the subject/s of the manuscript to be stated, while others have specified a field for subjects. There is extra data mentioned by Fattuhi and Samarrai in regard to publishing and editing the manuscript, and Fattuhi adds the location of other copies of the manuscript, if known by the cataloguer. However, Halwaji (2004) is of the opinion that it is not the role of cataloguer to try to discover whether the manuscript has been edited or published or even to report other locations of the manuscripts; this is the role of bibliographer and bibliography (Halwaji, 2004). This researcher thinks that providing such information via the cataloguing process could provide helpful and useful information to users, particularly those who are interested in editing manuscripts. Informing users that a manuscript has been published or edited could save time and effort by researchers and avoid re-editing or republishing the manuscript. Guiding a researcher or student to the location by providing information through cataloguing records can help the user to locate the desired manuscript.

In reality, an Arabic manuscript cataloguer is carrying out scientific research during cataloguing, which can be essential for manuscriptologists for locating a manuscript, and for their research process. Therefore, Arabic manuscript cataloguers participate in supporting research procedure (Hafyan, 1998). Much information can be extracted from external resources by the cataloguer; for instance, an author's full name and date of death, title verification and so on. This information can be gathered from biographies, bibliographies, authority files, etc, which are known as cataloguing tools.

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Information is also extracted and interpreted from the manuscripts themselves. This information may not be known to the manuscriptologist initially; for instance, the writing (autograph) or copying (apograph) date of a manuscript. A number of Arabic manuscripts do not include writing or copying date, and this is a challenge for cataloguers and manuscriptologists. In this case, the date could be ignored, or estimated based on paper, font, ink types, author or copyist century (Awwad, 1984; Mashukhi, 1994). The writing or copying date can be stated in the manuscript; however, this date can be incomprehensible to many. Dates in Arabic manuscripts were not necessarily written in numeric alphabetic form, they can also be written in fractions of dates. Dating by fractions has appeared in some Arabic manuscripts and many researchers refer to this approach of dating by fractions in the time of the Ottoman Empire. This approach of date based of dividing time into fractions (Déroche et al., 2006; Aloufi, 2008). An example of dating by fractions:

> *"Ibrahim Alkhtib had finished a manuscript and reported the date of finishing (... on Tuesday, in the fifth of the third sixth, in the third one-third of the third fourth, the ninth of the tenth, of the tenth ten, of the first tenth, in the second part of the Hijri Calendar[13] (Islamic Calendar)" (Aloufi, 2008).*

The explanation of the previous date fractions is as follows:

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[13] The Hijri calendar is the formal calendar for Muslims, and it begins in 622 CE. Further information can be found in Encyclopedia Britannica, available at:
http://www.britannica.com/EBchecked/topic/295700/Muslim-calendar

| Statement | Explanation | Date |
|---|---|---|
| Tuesday | clear statement | Tuesday |
| fifth of the third sixth | divided the month into six parts, each one-six five days. the third sixth between 11 and 15. the fifth sixth is 15. | 15 th |
| the third one-third of the third fourth | divided the year's months into four parts, each one-fourth is three months. The fourth third is between 7th and 9th month. the third one-third is the ninth month in Hijri Year (Ramadan) | Ramadan= 9th month of Hijri Year. |
| the nine of the tenth | divided the decade into years. This is the ninth year of the decade | 9th year |
| the tenth ten | divided century into ten decades. the tenth ten is the tenth decade in the century | 90-99 |
| the first tenth | divided the millenium into ten century. this is the first century of the mellenium between 001 to 099. | 001-099 |
| the second part of the Hijri Calendar | It is the second millenium of the Hijri Calender, which is after 1001 | 1001- |

**Figure 2-13: An Example of Dating by Fractions**

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To sum up, there are four models for cataloguing Arabic manuscripts in the KSA, have been analysed as illustrated in Table 2-3. These models are fairly similar, however there are some differences in regards to adding extra information such as; publishing and editing an Arabic manuscript and location other copies of a manuscript. There is an integration between Arabic manuscript cataloguers' and manuscriptologists' roles in dealing with the object (i.e. the manuscript) from different perspectives and purposes (Binebine, 1998).

There are some issues have been discovered during analysing the four individual cataloguing models of Arabic manuscripts regarding to previous mentioning features of Authorship in Arabic manuscripts (Page,38), and Commented Arabic manuscripts (Page,46). For example, all four models have not mentioning the role of other contributor in authoring (e.g. commentator) the content of a manuscript if it is existed. Therefore, the study has selected and examined Functional Requirements for Bibliographic Records (FRBR), to figure out the ability of FRBR to accommodate the issues, which have been presented previously (on page38). Number of studies have recommended using FRBR as conceptual model for digital libraries in terms of managing cultural heritage collections (Buchanan, 2006; Chamnongsri et al., 2006; Chamnongsri et al., 2010; Babeu, 2008), further discussion is (on page 101).

## 2.6 The Status of Arabic Manuscripts in the KSA

In this section a general background of KSA is first presented. The status of Arabic manuscripts within KSA is then briefly discussed in order to present a picture of Arabic manuscripts in the KSA.

## 2.6.1 Background

The Kingdom of Saudi Arabia, which is commonly known as Saudi Arabia, is located in the southwest of the continent of Asia, and is approximately 830,000 square miles in size (Figure 2-14). According to the Central Department of Statistics and Information, the KSA's population is roughly 27,563,432 (Central Department of Statistics and Information, 2010).



**Figure 2-14: KSA map; adapted from Wikimedia Commons**

The Saudi Arabian government has given considerable attention to education through allocating budgets, establishing infrastructures, providing free education, supporting life-long learning, etc. (Ministry of Education, 2011). The government allocations for education in the KSA since 2004-2009 (1425 to 1430 AH) are demonstrated in Table 2. There has been a particular focus on Higher Education by the government. There are approximately 24 government universities, providing free education to students.

**Table 2-4: Government Allocations for Education by Agency 2004-2009 (In millions SAR)**

| Year ⟍ Agency | 1426/1425 2004/2005 | 1427/1426 2005/2006 | 1428/1427 2006/2007 | 1429/1428 2007/2008 | 1430/1429 2008/2009 |
|---|---|---|---|---|---|
| Ministry of Higher Education | 466.2[14] | 911.6 | 3268.7 | 2932.7 | 4229 |
| King Abdul Aziz's Darat | 16.5 | 19.4 | 20.9 | 22.3 | 24 |
| Ministry of Education (male) | 25853.4 | 30534 | 31419.5 | 32904.7 | 37221 |
| Ministry of Education (female) | 26167.1 | 31686.4 | 32069.8 | 33729.5 | 38637 |
| King Saud University (Riyadh) | 2349.6 | 2691.8 | 2718.7 | 3137.6 | 3774 |
| King Fahad University for Petroleum & Minerals | 561.6 | 646 | 624.9 | 642 | 704 |
| King Abdul Aziz University, Jeddah | 1369.5 | 1604.3 | 1565.2 | 2035.3 | 2345 |
| King Faisal University | 693.8 | 795.2 | 805 | 1475.9 | 1636 |
| Imam Mohammad Bin Saud Islamic University | 1082.5 | 1226.9 | 1268.9 | 1325.6 | 1553 |
| Umm Al-Qura University | 588.9 | 711.9 | 672.5 | 998.5 | 1185 |
| Islamic University | 268.9 | 331.9 | 329.9 | 333.9 | 393 |
| King Khaled University | 432.4 | 443 | 461.8 | 964 | 1118 |
| Taibah University | 187.6 | 246.7 | 284.1 | 582.9 | 737 |
| Qaseem University | 296.6 | 390.8 | 413.2 | 748.7 | 888 |
| Taif University | 128.1 | 189.9 | 213.5 | 474.9 | 609 |
| Jazan University | 0 | 79.2 | 99.5 | 341.1 | 431 |
| ALgouf University | 0 | 75.2 | 105.3 | 324.3 | 445 |
| Hail University | 0 | 76.8 | 85 | 300.7 | 345 |
| Tabuk University | 0 | 0 | 66.7 | 244.4 | 287 |

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[14] 1 SAR = 0.171514 GBP. So this amount 466,200,000.00 SAR = 79,959,714.96 GBP. Source: OANDA, in 16-12-2011.

| | | | | | |
|---|---|---|---|---|---|
| AL-Baha University | 0 | 0 | 69.1 | 246.8 | 296 |
| Najran University | 0 | 0 | 68.1 | 211.6 | 246 |
| AL-Hudoud Alshamalya University | 0 | 0 | 0 | 230 | 276 |
| Princess Nora University for Girls | 0 | 0 | 955.4 | 1122.7 | 1187 |
| Higher Education Council | 0 | 8.6 | 15.3 | 18.5 | 20 |
| Total | 60462.7 | 72669.6 | 80589.7 | 85348.6 | 98586 |
| Education Projects | 5335.8 | 8685 | 11653.2 | 14799.6 | 18296 |
| Grand Total[15] | 65798.5 | 81354.6 | 92242.9 | 100148.2 | 116882.0 |

## 2.6.2 Arabic Manuscripts in the Kingdom of Saudi Arabia (KSA)

The Kingdom of Saudi Arabia is one of the few countries that possess a large quantity of Arabic manuscripts in repositories such as libraries, museums, and archive centres. Sa'ati (1993) reported that manuscripts in different languages are scattered throughout repositories in the KSA (Sa`Ati, 1993). Therefore, recording and controlling these manuscripts is a difficult task, especially when some of them are in private libraries of scholars, brokers and collectors. However, there are certain projects to record manuscripts in the KSA by some bodies (further details can be found in Controlling and Recording Arabic Manuscripts in the KSA section).

Sa'ati (1993) addressed the situation of Arabic manuscripts in the KSA, and reported that the total number of recorded Arabic manuscripts held at 24 academic, special, private, public libraries in the KSA was 163,512. Later, King Fahad National Library (KFNL) surveyed libraries in the KSA, and produced the Saudi Library and Information Centres Directory (SLICD) in book form and in an online database in 2007 (King Fahad National Library, 2007). According to the SLICD, 288,797 Arabic

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[15] Source: Kingdom of Saudi Arabia, Ministry of Finance; Budget Division (2010)

manuscripts (AMS) are held in 95 libraries (see Appendix E), excluding private or personal libraries.

**Table 2-5: Arabic manuscripts holdings in the KSA**

| Library Type | No. of Libraries | Total of AMSs | AMSs % by Library Type |
|---|---|---|---|
| Academic Libraries | **18** | **122260** | 54% |
| Public Libraries | **16** | **46601** | 21% |
| Special Libraries | **9** | **51780** | 23% |
| School Libraries | **51** | **1963** | 1% |
| National Library | **1** | **4200** | 2% |
| Total | **95** | **226804** | 100% |

As demonstrated in (Table 2-5), it is clear that academic libraries hold a significant percentage of Arabic manuscripts in the KSA. It is worth mentioning that according to SLICD, 51 school libraries hold Arabic manuscripts. By contacting them, either in person or over the phone, it was revealed that some of those manuscripts belonged to academic institutions; for example, the Scholarly Institution belonging to the Al-Imam Muhammad Ibn Saud Islamic University, or those school libraries holding a small number of Arabic manuscripts.

For study purposes, a convenience sample of libraries (i.e. providers) was selected (on page 128), as follows;

**2.6.2.1 King Fahad National Library (KFNL)**

KFNL was established as the national library on 3rd Dec 1989, by decree number (80) (King Fahad National Library, 2011). KFNL is the only national library in the KSA, and works towards activities such as preserving Saudi literature as a legal depository centre, assigning International Standard Book Numbers (ISBN) and International Standard Serial Numbers (ISSN), issuing national bibliographies, and preserving the national cultural heritage. The library has given great attention to maintaining, recording, cataloguing, and disseminating Arabic manuscripts, as it holds approximately 4200 Arabic manuscripts as assets (i.e. original; manuscript form) and 14500 in surrogates as microfilmed, digitised Arabic manuscripts. KFNL is attempting to record manuscripts owned by individuals and private institutions, particularly original manuscripts. To achieve this, KFNL provides the owner of a manuscript with a registration certificate for each manuscript, and requests a digital copy of the original script. In addition, KFNL is responsible for the Manuscript Heritage Protection Act, by which it is authorised to obtain a digital copy of each original manuscript owned by institutions in the KSA.

**2.6.2.2 Central Library of Umm AlQura University (Currently known as: King Abdullah Bin Abdullaziz University Library (KAAUL)**

King Abdullah Bin Abdullaziz Library is the central library of Umm Al-Qura University in Makkah Almukarmah and provides its services to the university community (faculty staff members, students, etc) for teaching and research purposes. Umm Al-Qura University provides higher education and has fourteen faculties, such as Islamic studies,

social sciences, arts and humanities, Arabic languages, medicine, pharmacy, applied science and many more. The university provides higher education opportunities in editing Arabic manuscripts in disciplines such as Islamic language, literature and history. It has awarded 420 higher academic degrees, such as Ph.D, and MA, for editing Arabic manuscripts (Abdaljabbar, 2006).

KAAUL holds around 18,500 Arabic manuscripts, which is only a part of the whole collection that Umm Al-Qura University owns. The Scientific Research Centre at Umm Al-Qura holds over 22,000 manuscripts in paper, microfilm and digital forms, which are soon to be transferred to KAAUL.

### 2.6.2.3 Central Library of King Saud University (Currently known as Prince Salman Library) (PSL)

Prince Salman Library, located in Riyadh, found in 1957 AD, is the central library of King Saud University, the first KSA University that is not devoted to religious subjects. The university has more than 37,874 students, and 4849 staff members (including teachers and researchers). It has 26 facilities, including Engineering, Science, Medicine, Pharmacy, Nursing, Education, and many more. In addition, the university also provides teaching and research in religious studies, languages, and historical studies, in independent departments. Abdaljabbar, (2006) reported that the university had granted 40 higher academic degrees for editing Arabic manuscripts until 2000AD. PSL has taken initiatives to collect Arabic manuscripts by purchasing and exchanging them with other

libraries from around the world. Sa'ati (1993) reported that PSL had 25,850 Arabic Manuscripts; this has now risen to 32,440.

## 2.6.2.4 Central Library of Al-Imam Muhammad Ibn Saud Islamic University (CL-AIMISIU)

Al-Imam Muhammad Ibn Saud Islamic University, established in 1953, is located in Riyadh and has eleven facilities with 40 departments catering to Islamic studies, Languages and Literature, Social and Humanities, Science and Technology, Medicine, Engineering and more. The university pays meticulous attention to editing and publishing Arabic manuscripts. 522 academic higher academic degrees have been awarded by Al-Imam University for editing Arabic manuscripts, and publishing 75 of those in a book form (Abdaljabbar, 2006). The university has more than 25,000 students and 1,300 academic staff members. In 1993, CL-AIMISIU held over 23,000 Arabic manuscripts in various subjects, which are unique and valued (Sa`Ati, 1993).

## 2.6.2.5 The Central Library of the Islamic University in Madinah (CL-IU)

The Islamic University, founded in 1961AD by a royal decree and located in Al Madinah Al Munawwarah, specialises in Islamic sciences and Arabic language studies. In 2010AD, it had 23,000 students. The university has awarded 353 academic higher degrees until 2000AD for editing Arabic manuscripts. Sa'ati (1993) estimated that it held 34,847 Arabic manuscripts; however, SLICD reported that Arabic manuscripts in CL-IU numbered as many as 23,638 (Kfnl, 2007). In fact, the discrepancy between the two

surveys is due to the definition of Arabic manuscripts covered by the surveys. Sa'ati (1993) covers Arabic manuscripts in original (i.e. assets) (3,536), and surrogate (31,311) forms, while SLICD has limited itself to original manuscripts only (23,638). According to the latest statistical report issued by CL-IU, it holds 48,100 Arabic manuscripts.

**2.6.2.6 Central Library of King Abdulaziz University (CL-KAU)**

King Abdulaziz University established in 1967AD, is located in Jeddah, and houses over 40,000 students. The university has sixteen faculties, such as Arts and Humanities, Science, Medicine, Pharmacy, Home Economics, Earth Science, Environment and Design, and many more. CL-KAU holds 3,200 Arabic manuscripts in original form and 2,200 Arabic manuscripts in microforms.

**2.6.2.7 King Faisal Centre for Research and Islamic Studies (KFCRIS)**

KFCRIS is a section of King Faisal Foundation, founded in 1983AD to serve and accomplish the foundation's aims and objectives, which are:

- Raise awareness of Islamic civilisation, and its contribution in human heritage.

- Support research and studies in all areas related to Islamic civilisation.

- Contribute to preserving and organising Islamic heritage, and make it accessible to researchers.

- Participate in the Heritage Revival movement by providing primary resources, such as manuscripts, to researchers and editors, and contribute by publishing these resources.

- Contribute to translation from Arabic into foreign languages and vice versa.

KFCRIS, as previously stated, has interests in Islamic and Arabic studies and hence it is considered the largest manuscript holder in the KSA, with 90,907 manuscripts (25,907 originals, 60,000 microforms, and 5,000 digitised). Sa'ati (1993) reported that the KFCRIS held approximately 20,287 manuscripts, but KFCRIS's manuscript collection has increased since 1993. It is worth mentioning that KFCRIS has established twelve databases, all which are available from KFCIRS locally (i.e. through intranet). Three databases concentrate on Islamic manuscripts while the rest focus on other subjects such as bibliographic databases of Islamic economics, Islamic Information, Islamic World, etc. More details about the three databases are explained (on page 75).

### 2.6.2.8 The Noble Prophet's Mosque Library (NPML)

NPML in Al Madinah Al Munawwarah is a fellowship of General Presidency of Two Holy Mosques' Affairs. The library provides services to visitors and worshippers to the Noble Prophet's Mosque. The library has valuable and unique Arabic manuscripts such as Sahih Al-Bukhari, copied in 856AH-1472AD, which is divided in 20 volumes. The total number of Arabic manuscripts at NPML is 23,650, with 5,400 original manuscripts, 2,500 photocopied Arabic manuscripts on paper, 750 Arabic manuscripts in microforms, and around 15,000 digitised Arabic manuscripts on CD-ROMs.

### 2.6.2.9 King Abdulaziz Public Library (KAPL)

KAPL, located in Riyadh and founded in 1985AD, has taken the initiative to collect Arabic manuscripts as a part of achieving its goal of "Dissemination of knowledge, culture and information, especially Arabic and Islamic, and attention to Arab and Islamic culture, as well as participation in its revival and renewal" (Kapl, 2011). KAPL holds manuscripts not just in Arabic but in other languages such as Turkish, Persian, and Latin, along with some valuable historical documents. KAPL holds over 5100 Arabic manuscripts. The Arabic manuscript collection at KAPL has increased from the 620 reported by (Sa`Ati, 1993).

### 2.6.2.10 The Library of Saud Albabtain Centre for Cultural Heritage (LSAC)

The Saud Albabtain Centre for Cultural Heritage is a charitable organisation located in Riyadh which aims to collect, preserve, and organise Arabic cultural heritage materials, especially inscribed cultural heritage such as manuscripts. The LSAC provides its services to researchers, scholars, and students who are interested in Arabic manuscripts. The library holds over 23,000 Arabic manuscripts. Recently, the library produced a descriptive catalogue of some of their original Arabic manuscript collection in two volumes.

## 2.6.3 Controlling and Recording Arabic manuscripts in the KSA

### 2.6.3.1 Manuscript Heritage Protection Act

In 2001AD (1422AH) a Royal Decree was issued by the then Prime Minister, King Fahad Ibn Abdulaziz, to preserve Arabic manuscripts in the KSA, under the Manuscript Heritage Protection Act. The act authorises KFNL to protect inscription heritage in KSA, through the third Article of the Act, which gives KFNL the rights of:

A. Acquiring original manuscripts by purchasing, donation or endowment;

B. Recording the preserved manuscripts at libraries owned by individuals and institutions, and awarding registration certificates;

C. Cooperation with other libraries which provide restoration and maintenance services for manuscripts;

D. Imaging all original manuscripts that are held by libraries or individuals, and keeping a copy at KFNL, for the benefit of the researchers. In cases of depositing a copy in a private repository, it should be secure and kept in a safe place that is at least four kilometres distant from the Arabic manuscripts' provider;

E. Cataloguing manuscripts that are present in KSA, and producing a descriptive catalogue in serial for each collection;

F. Exchanging manuscripts' images with any institution within and outside the KSA.

However, here we need to bear in mind that the term 'manuscript' in the Act includes any manuscript in any language.

KFNL started the first stage of Preserving National Cultural Heritage Project (PNCHP) in 2007. This project covered manuscripts held at nine institutions (i.e. Arabic manuscript providers) in the KSA. The project was outsourced and was completed in the end of 2008. Through analysing the reports that issued by KFNL, it is been found that there are 40,131 Arabic manuscripts, comprising 11,685,434 pages, pictured using a digital camera. All images produced are in TIFF (Tagged Image File Format) as master files. The second stage of the Preserving National Cultural Heritage Project is currently underway, to complete the remaining manuscripts of the providers shown in the table below, along with those of other providers.

**Table 2-6: No. of scanned Arabic manuscripts under the National Preservation of Original Manuscripts Project**

| No. | Provider | No. of AMSs | No. imaging pages |
|-----|----------|-------------|-------------------|
| 1 | PSL | 8310 | 207,757,8 |
| 2 | CL-AIMISIU | 8152 | 208,697,6 |
| 3 | Abdulallah Ibn AlAbas Library | 431 | 104,342 |
| 4 | Makkah Almukaramh Library | 1623 | 464,846 |
| 5 | KAAUL | 2962 | 942,650 |
| 6 | CL-KAU | 1252 | 419,664 |
| 7 | King Faisal University | 242 | 580,04 |
| 8 | King Abdulaziz Library in Al-Maddinah Al-Monurah | 12944 | 460,507,4 |
| 9 | KFNL | 4215 | 927,300 |

The Manuscript Heritage Protection Act states that KFNL should take part in cataloguing the existing manuscripts. Unfortunately, no action has been taken with regard to this clause of the Act. Moreover, some problems have been reported by Arabic manuscripts' providers regarding the digitisation of Arabic manuscripts by the authorised company (i.e. contractors) (further details are given in Chapter Five on page 170).

### 2.6.3.2 KFCIRS Databases

#### *Bibliographic Database of Islamic Manuscripts at KFCIRS*

This database contains descriptive data regarding Arabic manuscripts, held by KFCIRS. The database contains the following fields:

- Recording Number

- Subject

- Main title

- Subtitle

- Author name

- Author date (birth-death)

- Incipit

- Explicit

- Font type

- Copyist name

- Copying date

- Copying place

- Note

- Number of pages

- Number of lines

- Recall number

- Source

### *Database of Edited and Published Manuscripts*

This database contains the available information regarding edited and published Arabic manuscripts. Arabic manuscript users whose interest lies in editing the scripts usually enquire as to whether it was an edited manuscript, who the editors were, whether or not it was published, date of editing, etc.

### *Treasury of the Heritage: a Bibliographic Database*

This is one of the most important databases for users, as it contains Islamic and Arabic manuscript catalogues created by libraries, museums, and archival centres in any part of the world. This database can be described as a union catalogue of Islamic and Arabic manuscripts in any part of the world. It contains descriptive data of around 50,000 manuscripts. It provides the user with the location/s of the desired manuscript. The following geographical information is provided: country, city, provider, recall number. However, the database has ceased to accumulate further manuscripts, due to funding issues.

# CHAPTER THREE ARABIC MANUSCRIPTS IN THE CONTEXT OF A DIGITAL LIBRARY

## 3.1 Introduction

The previous chapter contained a brief introduction to Arabic manuscripts (e.g. definition, history and holdings, importance, features, etc), some issues relating to technical processes (i.e. cataloguing), and the status of manuscripts in the study field (i.e. Kingdom of Saudi Arabia). This chapter will address the topical field of the study, which is the digital library. As stated in Chapter One (see page12), this study aims to define best practice for a digital library of Arabic manuscripts, with a focus on user-centred requirements. Therefore, a review of the available literature relating to a background to digital libraries, and the expected advantages of a digital library for Arabic manuscripts, are discussed in this chapter. A sample of digital libraries that provide access to Arabic manuscripts is also presented, as a result of surfing the web and analysing available literature (e.g. project reports, articles, etc). Finally, this chapter will examine a conceptual model for managing Arabic manuscripts in a digital library, which is Functional Requirements for Bibliographic Records (FRBR).

## 3.2 Digital Library Background

There are several definitions of digital library in the available literature. These definitions reflect the perspectives of different disciplines of research communities in this field. Chowdhury, G. G. & Chowdhury, S. (2003) have reviewed certain definitions of digital libraries, concluding that different definitions of digital libraries vary in their emphasis on content and/or service (Chowdhury and Chowdhury, 2003).

Before presenting digital library definitions, questions may be asked about the term "Digital Library": when was the first appearance in the literature? Are other terms used as synonyms? Lesk, M. (2005) attributes the term to Vannevar Bush in 1945, when he gave a vision of the digital library – he did not coin the term - in his essay entitled "As We May Think", which was first published in The Atlantic Monthly July 1945. Muhammad (2006) reported in his book "Digital Libraries; in theory and practice" that the first appearance of "Digital Library" in the literature was in a summary of a conference paper by Patrice Lyons, entitled "Policy Issues in Computer Networks" in 1989. However, by searching the Library and Information Science Abstracts (LISA) database and some full-text search engines (e.g. Scirus), the first appearance of the term "digital library" was in the report by Robert Khan and Vinton Cerf, entitled "An open architecture for a digital library system and a plan for its development" in 1988. A number of terms (e.g. electronic library, virtual library, hybrid library, library without walls, cyber library, etc.) are used sometimes interchangeably in the literature, while at other times a distinction between these terms is made. For example, Chowdhury, G. G. &

Chowdhury, S. (2003) mention a hybrid library: "a library where digital and printed information resources co-exist and are brought together in an integrated information service accessible locally as well as remotely" (Chowdhury and Chowdhury, 2003). Moreover, Tennant (1999) makes a distinction between an electronic and a digital library, based on content: an electronic library can include any digital, analogue, and/or electronic materials, while a digital library only contains materials in digital (Binary) form, so the concept of a digital library is included within the definition of an electronic library.

Having presented a discussion of the term "digital library", it would be worth mentioning an early vision of the World Wide Web and, in this context, of the digital library concept. In 1934, Paul Otlet imagined in his book *Traité de documentation* a future time when users would be able to access information archived data "from great distances by means of an 'electric telescope' connected through a telephone line, retrieving a facsimile image to be projected remotely on a flat screen" (Wright, 2003). This vision has now been achieved, and many documents, images, books, etc, are indeed displayed in a flat screen, despite being located in a different part of the world. Moreover, that flat screen has now become portable, with such devices as iPads, Kindles, Smartphones, and so on.

As previously mentioned, there are several definitions of digital library. This study does not set out to provide a comprehensive cover of digital library definitions, but rather to present some selected definitions that serve to give a general view of the digital library concept. The Digital Library Federation DLF (1998) defines digital libraries as:

*" organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities" (Digital Library Federation, 1998).*

Arms (2000), in his book "Digital Libraries", takes the view that a digital library is;

*"...a managed collection of information, with associated services, where the information is stored in digital formats and accessible over a network. ...Digital libraries contain diverse information for use by many different users. ...The unifying theme is that information is organized on computers and available over a network, with procedures to select the material in the collections, to organize it, to make it available to users, and to archive it."* (Arms, 2000).

Borgman (1999) provides two definitions of digital library to connect between two disparate communities; those who work on and those who conduct research in digital libraries:

*"Digital libraries are a set of electronic resources and associated technical capabilities for creating, searching and using information. ..."*

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*"Digital libraries are constructed, collected and organized, by (and for) a community of users, and their functional capabilities support the information needs and uses of that community. ..."(Borgman, 1999).*

Borman's second definition (1999) makes reference to the user-centred nature of digital library development. Tedd and Large (2005) emphasise the user contribution in developing and establishing a digital library.

## 3.3 Potential benefits of digital libraries

Great attention has been devoted in previous studies to reporting the benefits or advantages of digital libraries. Perhaps the obvious advantage is the fact that they can help to overcome geographical barriers by providing information online (Tedd and Large, 2005b; Witten and Bainbridge, 2003; Arms, 2000). Reduction of the time spent on accessing information is one of the strengths of a digital library. In addition, the cost of providing information via digital libraries is lower than with traditional approaches. In addition, the digital divide is narrowed (Chowdhury and Chowdhury, 2003). The sharing of information and improved collaboration between digital libraries are further advantages, (Arms, 2000; Chowdhury and Chowdhury, 2003). Digital libraries can help with long-term preservation of information resources, especially archival and historical resources (e.g. medieval manuscripts), by providing facilities to access surrogates of such fragile materials (O'keefe, 2000; Chepesiuk, 2001; Crane et al., 2003; Deegan and Tanner, 2006).

Digital libraries play a significant role in serving cultural heritage materials, especially inscribed heritage. A number of studies have mentioned the necessity of investing in recent technologies (e.g. digital libraries) in order to facilitate access to these materials, while at the same time saving and preserving them from, for instance, frequent handling or misuse (O'keefe, 2000; Nicolas et al., 2003; Boserup, 2005; Liew, 2006). Therefore, there are digital libraries of cultural heritage materials available online; for example, the World Digital Library (WDL). It is worth mentioning that Arabic manuscripts have received sufficient attention that they are  made available online via methods such as digital libraries. However, these digital libraries are still less than ambitious, considering the large quantity of Arabic manuscripts that exist in different parts of the world, and the high demand by users.

## 3.4 Arabic Manuscripts in the Context of a Digital Library

Some researchers take the view that a digital library can be of great benefit to the Arabic manuscripts themselves, firstly by preserving them and saving these materials from, for instance, frequent handling (Al-Khatib et al., 2007; Boujdad-Mkadem and Nieuwenhuysen, 2009), and secondly by providing wider access to Arabic manuscripts for users (Leydier et al., 2007; Liew, 2005; Le Bourgeois and Kaileh, 2004). Therefore, a number of projects have been undertaken to digitise Arabic manuscripts. An example of this is the World Digital Library, led by the Library of Congress in cooperation with several international bodies, such as UNESCO, the Bibliotheca Alexandrina, King Abdullah University of Science and Technology, etc. Additionally, there have been some digitisation projects at a regional/local level, such as Digital Resources for Islamic Studies funded by the Joint Information Systems Committee (JISC) in the UK, Princeton Islamic Manuscripts Collections, and Preserving National Cultural Heritage Project by KFNL (on page 75).

Therefore, some digitised Arabic manuscripts are available online; whether via digital libraries, websites, electronic forums, online databases, etc. Some examples are reported in this chapter. This study does not intend to survey all websites that present Arabic manuscripts, but rather to present some of the better-known examples, both in the location being studied (i.e. KSA) and globally.

### 3.4.1 Islamic Medical Manuscripts at the National Library of Medicine

Creator: *National Library of Medicine*

URL: http://www.nlm.nih.gov/hmd/arabic/welcome.html



**Figure 3-1: Islamic Medical Manuscripts at the National Library of Medicine (Screenshot)**

The collection of Islamic Medical Manuscripts at the National Library of Medicine contains Arabic as well as non-Arabic manuscripts, written during the Islamic civilisation in Persian and Ottoman. In addition, the previewed manuscripts do not focus only on medicinal subjects, but also on other subjects such as Literature, Mathematics, History, Astronomy, and more. The site provides around 300 catalogues and colourful images of manuscripts that can be browsed by subject or thumbnail. The targeted users are students, scholars, and researchers and, hence, it provides "…an extensive glossary of medical, scientific, and book-production terminology" (National Library of Medicine, 2008), that helps users to discover the meaning of terms that appear on the website. The

site just previews sample pages of manuscripts in JPG format, however descriptive details are provided for each manuscript. The descriptive detail elements are as follows:

- Title: (Arabic) Transliteration             (recall no)

- Title: Translation

- Creator name: Transliteration        (Lifespan of author)

- Creator name: Arabic name

- Brief biography about the creator, and brief introduction to the manuscript content. Other available copies if known. All this information is supported by references.

- Illustrations: shows the opening (incipit), and ending (explicit) text of manuscript, illustrations if available, decorations, stamps, etc.

- Physical Description: number of pages or leaves, Dimensions, Number of Lines, Script type, Script colour, comments, marginal notes, Notes.

- Binding: detailed description of binding: material, colour, damage

- Provenance: both in the past, by what is written or stamped inside the manuscript, and in the present: when, how, or/and where collected, purchased, or/and obtained.

- References: references (bibliographies, and/or biographies) that refer to the manuscript or its author/s.

### 3.4.2 Islamic Heritage Project (IHP)

Creator: *Harvard University Library*

URL: http://ocp.hul.harvard.edu/ihp/



**Figure 3-2: Islamic Heritage Project website (Screenshot)**

Harvard University Library has launched a digital library of Islamic manuscripts, roughly 280 in number, and other materials. This project was funded by Prince Alwaleed Bin Talal. The IHP digital library provides online access to the digitised collection via Page Delivery Service (PDS) system, and the description is linked to the university OPAC library system (HOLLIS). The collection covers several subjects, such as "religious texts and commentaries; Sufism; history, geography, law, and the sciences (astronomy, astrology, mathematics, medicine); poetry and literature; rhetoric, logic, and philosophy; calligraphy, dictionaries and grammar", and in a number of languages, "primarily Arabic, Persian, and Ottoman Turkish; also Urdu, Chagatai, Malay, Gujarati,

Indic languages, and several Western languages" (Harvard University Library, 2011). There is a limited facility preview a number of pages of Arabic manuscripts. Manuscript images are in JPEG formats, and can be viewed as Turn-To-Page.

### 3.4.3 World Digital Library (WDL)

Creator: *UNESCO*

URL: http://www.wdl.org/en/



**Figure 3-3: World Digital Library (Screenshot)**

In April 2009, the WDL was launched to the public, and the idea of establishing this DL dates back to 2005 when "Librarian of Congress James H. Billington proposed establishing a World Digital Library to UNESCO" (Unesco, 2011). UNESCO had launched a project to preserve the world heritage called "Memory of the World Programme" through funding projects for preservation and conversation of global

cultural heritage (Unesco, 1997). Many of the funded projects have been involved in WDL. Contributions have been made  by some Arab institutions and bodies, from countries such as KSA, United Arab Emirates, Qatar, Egypt, Yemen, Iraq and others, through financial funding and/or provision of materials (by countries such as KSA)16. WDL contains 286 manuscripts, 383 books, 54 journals, 345 maps, 11 motion pictures, 66 newspapers, 1367 prints and photographs, and 5 sound recordings. These materials are in many languages, and WDL provides descriptions of these materials in Arabic, Chinese, English, French, Portuguese, Russian, and Spanish to facilitate cross-language retrieval. There are 114 Arabic manuscripts from 13 countries presented in WDL.

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16 Further reading about WDL contributors and partners on: http://www.wdl.org/en/about/partners.html

### 3.4.4 Wellcome Arabic Manuscripts Online

Creator: *Wellcome Trust Library*

URL: http://wamcp.bibalex.org/en/home



**Figure 3-4: Wellcome Arabic Manuscripts Online (Screenshot)**

This project is the result of cooperation between the Wellcome Library, the Bibliotheca Alexandrina, and King's College London Humanities Department, and was funded by JISC and the Wellcome Trust. It offers a "rich digital manuscript library available online free of charge, which represents a significant resource for a wide range of researchers - including Arabic studies scholars, medical historians and manuscript conservators - to aid and enhance their work" (Wellcometrust, 2011) as part of the DigIslam project which was funded by JISC. On 27 July, 2011 the Wellcome Library launched some of its Arabic collection to be previewed and searchable online. Manuscripts in the digital library can be found by browsing by manuscripts' titles or by searching the description data. In fact, the project that the Wellcome Trust was involved

in, along with other partners, focused on designing a cataloguing system to manage and control descriptive metadata of manuscripts, and adopted the Text Encoding Initiative TEI:P5 Guidelines17. The digital library makes a considerable number of Arabic manuscripts available to preview on a web-browser. It is enhanced by facilities for zooming in/out of the manuscript, and some other personal features for users, such as; ability for comparing more than one manuscript.

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[17] Further reading about TEI P5 at: http://www.tei-c.org/Guidelines/P5/ , and Enrich Project European Networking Resources and Information Concerning Culture Heritage at http://enrich.manuscriptorium.com/ .

### 3.4.5 Digitised Arabic Manuscripts at the AUB Libraries

Creator: *American University of Beirut, Jefet Library.*

URL: http://ddc.aub.edu.lb/projects/jafet/manuscripts/

**Figure 3-5: Digitised Arabic Manuscripts at the AUB Libraries (Screenshot)**

The Jefet Library at American University of Beirut makes twenty-seven Arabic manuscripts available online. The Jefet library holds approximately 1,400 manuscripts in different subjects and languages, the majority in Arabic. These manuscripts were selected and digitised under a project entitled "AUB Manuscripts Appraisal Project", undertaken

and contracted in 2002.  The allowance page allows a preview of only a few pages of the manuscript, and a full preview is available only by contacting the library.18

Each manuscript leads to a brief description, which contains:

- Title in Arabic

- Creator in Arabic

- Title transliteration

- Creator transliteration

- Brief introduction to the manuscript

- Call number

- Dates of author's birth and death

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**3.4.6 Manuscript (Makhtota) Digital Library of Arabic Manuscript in PSL**

Creator: *King Saud University, Prince Salman Library* (PSL)

URL: http://makhtota.ksu.edu.sa/MakhtotaEnglish.aspx



**Figure 3-6: Manuscript Digital Library (Screenshot)**

King Saud University has established a digital library of its Arabic manuscript collection at Prince Salman Library (PSL). According to the statistics, eleven thousand Arabic manuscripts in the digital library are available to be browsed or searched via their bibliographic records. Manuscripts can be displayed on a web browser, and it is also possible to download them in PDF form. Recently, the digital library has limited manuscript downloading in bulk. If a user wants to download a manuscript, he/she will have to download each page of the manuscript separately in PDF form. The collection may be browsed according the title of the manuscript; however, there is no specification possible such as ordering manuscripts' titles in alphabetical order. The digital library provides the facility to search the bibliographic records in the following fields:

Manuscript name, Author's name, Author's dates, Description, Material description, Subject, Referrals, Reproducer's (i.e. copyist's) name, Copy date, Category No, General No, and References. The digital library has bilingual (Arabic and English) interfaces for finding and locating manuscripts. It is worth mentioning that the digital library has taken the initiative of translating the manuscript titles and some data that follow the manuscript. In addition, the library has pioneered the conversion of manuscript texts into ASCII format, by encouraging users to rewrite the texts on the website word-processors.

### 3.4.7 Digital Library at KAAUL: Manuscripts

Creator: *KAAUL*

URL: http://uqu.edu.sa/lib/digital_library/scripts_all



**Figure 3-7: Digital Library at KAAUL: Manuscripts' Sector (Screenshot)**

KAAUL has made 3039 scanned Arabic manuscripts, as well as other resources such as electronic theses, available online via a digital library at the university. The manuscripts available are in different disciplines, such as mathematics, chemistry, Arabic literature, medicine, philosophy, etc. Browsing manuscripts is by subject . The digital library provides brief details of a manuscript's bibliographic data: Manuscript title, Manuscript's copier, Manuscript No., Manuscript's subject, and Number of pages in manuscript. The digital library has limited user browsing of manuscripts by number of pages. The(Babeu, 2008) online content of the digital library is managed by a module of the Horizon Library Automation System19.

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[19] KAAUL used to manage its collection using DSpace open software, the first university to use this type of software in the KSA.

### 3.4.8 Digital library of Arabic Manuscripts in Literature

As previously mentioned, there was some interest from researchers regarding expanding horizons to make Arabic manuscripts available online, with a focus on using digital libraries. The majority of current efforts and studies to make Arabic manuscripts available online via digital libraries have focused on digitising, storing, organising, and visualising manuscripts. They tend, therefore, to concern technological issues, such as digitisation equipment and standards, recognition of handwriting (e.g. Optical Character Recognition – OCR), as well as indexing, annotating, and retrieving Arabic manuscripts, such as Content-Based Image Retrieval (CBIR). CBIR *"is an area where knowledge is being extracted from the image content of the digital picture archives" (Ivanova et al., 2010).* Use of CBIR in indexing digital images has increased, especially for texture images such as a digitised Arabic manuscript image (Shahab et al., 2006; Al-Khatib et al., 2007).

Khorsheed, M. S. (2003) contends that OCR is not an entirely suitable approach to deal with handwritten documents, especially Arabic manuscripts, due to a lack of recent technology that recognise Arabic alphabets (Khorsheed, 2003). Leydier, Y. et al., (2007) stress that: "There is currently no efficient solution to automatically read medieval manuscript text with good accuracy. Most of the problems encountered by recognition systems stem from difficulties segmenting characters or words, the variability of the handwriting, the complexity of the styles and the open vocabulary". There is no doubt that the OCR approach to the Arabic alphabet is useless for Arabic manuscripts (Leydier

et al., 2007). Al-Khatib, et al., (2007) proposed a document analysis and indexing system that recognises handwritten scripts to analyse scanned Arabic manuscripts, and they concluded that there were still difficulties in recognising Arabic handwritten manuscripts (Al-Khatib et al., 2007).

Using another method of technological extraction of metadata from Arabic manuscript images, there were some studies that showed progress. Le Bourgeois, F., & Kaileh, H. (2004) digitised six Arabic manuscripts and 2 Latin manuscripts, comprising 1361 single page images of the manuscripts. The results showed that extracting some physical metadata from images scanned from original manuscripts was satisfactory to identify main text (i.e. *matn*), notes (i.e. marginal comments), illuminated ornaments and frames and punctuation with regard to the digitised Arabic manuscripts (Le Bourgeois and Kaileh, 2004).

Borgman (1999) defines a digital library as "a set of electronic resources and associated technical capabilities for creating, searching and using information" and that "..are constructed-collected and organized – by [and for] a community of users and their functional capabilities support the information needs and users of that community." (Borgman, 1999). Users' studies within digital libraries become part of the libraries themselves. User needs and requirements should be taken into account when establishing and developing a digital library (Tedd and Large, 2005b). Kimani, et al (2005) describe acknowledgement of user needs and requirements as being of "key importance for guiding the development (and evaluation) process of any system. This is no less true in

the arena of Digital Libraries" (Kimani et al., 2005). Perhaps, specifying users' needs and requirements for digital libraries of cultural heritage is a crucial if we recognise that those users may have specific requirements to fulfil their desire and research purpose (Crane, 2002; Buchanan et al., 2005). Mergoupi-Savaidou, Katifori, & Tympas, (2008) reported that historians who deal with papyrus have specific requirements that may vary from other historians, such as the ability to print the primary resources (Mergoupi-Savaidou et al., 2008).

Users' needs and requirements of digital libraries of Arabic manuscripts have not received sufficient attention from past researchers. It could be that the available study that has been conducted in terms of specifying the user's resource requirements for those who are interested in Islamic studies in the UK. Auchterlonie and Abu-Zayed (2008) have surveyed UK academic institutions to investigate information resources in the field of Islamic studies, for the purpose for providing a comprehensive review of these resources in order for them to be digitised and make them accessible; this review was funded by JISC. Arabic manuscripts were among these Islamic resources. One of the findings of the study is that users had prioritised access to Arabic manuscript catalogues over access to the manuscripts themselves. (Auchterlonie and Abu-Zayed, 2008).

## 3.5 Using the FRBR Model as a Conceptual Model for Arabic Manuscripts in the Context of a Digital Library

In Chapter Two, a number of issues regarding cataloguing and managing Arabic manuscripts in traditional libraries have been discussed. These issues are summarised as follows:

A lack of frequently-used Arabic manuscript cataloguing models to accommodate and present, for instance, authorship contributors, mapping works (e.g. bibliogram, biblio-chronogram).

There are no unified standards or rules for describing and cataloguing Arabic manuscripts in the studied libraries.

This study aims to provide best practice for a digital library of Arabic manuscripts. A number of previous studies have suggested Functional Requirements for Bibliographic Records (FRBR) as a collection management system in digital libraries. Debrowski et al (2008) mentioned that FRBR has become more popular with digital libraries for study and practice.

The study of Ercegovac (2006) was perhaps one of the earliest studies to attempt to emphasise the application of FRBR in digital libraries. The study concluded with a discussion of the necessity of designing mechanisms that help users to find the desired resources which "are linked together by explicitly expressed relationships" (Ercegovac, 2006) in a digital library. Buchanan (2006) reported that applying FRBR as a conceptual model to enrich descriptions of works in digital libraries will assist with better collection

management and organisation (Buchanan, 2006). A study by (Chamnongsri et al., 2006) addressed the use of the FRBR as a conceptual model for development of a metadata schema for a digital library of Thai Palm Leaf Manuscripts (PLM).

This study examines the application of FRBR as a conceptual model to manage Arabic manuscripts in a digital library. This examination is based on certain aspects of Arabic manuscript authorship, mentioned in the preceding chapter (*Chapter 3*), and the extent to which they can be better accommodated and presented. In particular, the FRBR model could help users to find and identify: "a) works of prolific authors, and all their expressions, b) works that exist in many versions and/or formats" (Croissant, 2012). Moreover, the FRBR model would better represent the relationships between different works in digital libraries (Ercegovac, 2006).

### 3.5.1 FRBR Background

The International Federation of Library Associations and Institutions (IFLA) proposed an entity relationship model called Functional Requirements for Bibliographic Records (FRBR), and approved this in 1998. The FRBR model is conceptual and defines a structured framework of entities, attributes and relationships for bibliographic records.

The FRBR model is, in fact, a user-centred model based on users' tasks (i.e. find, identify, select, and obtain) in order to meet their information needs (International Federation of Library Associations, 2009). FRBR has been accepted by many bodies, and have changed how information media is treated. In addition, FRBR has provided solutions for the treatment of a wide variety of information media. One work can be

embodied in more than one format and may have one title, or may be revised. In the following, the FRBR Model Group 1 is examined in terms of its application to Arabic manuscript characteristics.

The four primary entities in the FRBR are:
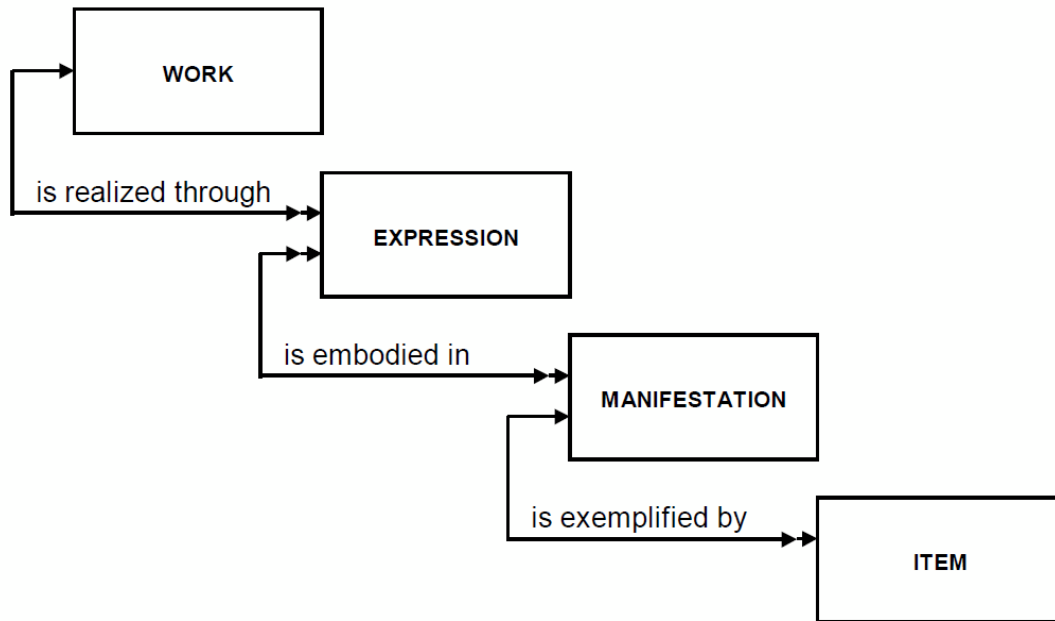


**Figure 3-8: FRBR Model Group1. Primary Entities and Relationships**

These four entities (Figure 3-8) provide "[A]n effective framework for the design of a metadata schema that can support the various functions required for access to and management of resources in PLM collections" (Chamnongsri et al., 2006). Therefore, FRBR can be applied to Arabic manuscripts as a conceptual framework. Reconceptualising the first entity of the FRBR's four hierarchical entities as the work of an Arabic manuscript is discussed below.

### 3.5.2 FRBR in Context of Arabic Manuscripts

First entity: Work represents a unique intellectual concept that has a distinct identity, which in this study is identified by Arabic manuscript titles. An example of this is *Sahih Al-Bukhari* by *Muhammad Ibn Ismail Al-Bukhari* (Figure 3-9). The work is realised through its relationship with its expression - created by a person or corporate body - identified by object, event, place, or/and concept.

Second entity: Expression represents the various variations, editions, revisions, etc, of a work, embodied in its relationships with one or more manifestations (Chamnongsri et al., 2006). A work may be realised in more than one expression. The expression is realised by a person or corporate body - identified by object, event, place, and/or concepts (International Federation of Library Associations, 2009). In the context of Arabic manuscripts, expressions may be realised through a working alphabet and language. As an example, *Sahih Al-Bukhari* was realised in the Arabic alphabet. However, on a practical level, the variations of expressions that could have benefits for or needs by users would be identified.

"Variations that would be evident only from a more detailed analysis and comparison of expressions (e.g. variations between several of the early texts of Shakespeare's Hamlet) would normally be reflected in the data only if the nature or stature of the work warranted such analysis, and only if it was anticipated that the distinction would be important to users." (International Federation of Library Associations, 2009).

In terms of Arabic manuscripts, copies of a work, as previously mentioned concerning *alarzah* and *alabrazah* (ref*), could be applied as varieties of expressions of the same work.

Third entity: Manifestation "represents the physical embodiment of an expression" (Chamnongsri et al., 2006) of a work (International Federation of Library Associations, 2009). Therefore, manifestation includes a variety of physical formats, such as manuscript, book, audio tape, etc. A manifestation is produced by person/s or a corporate body - identified by object, event, place, or/and concept (International Federation of Library Associations, 2009). In the context of Arabic manuscripts, a manifestation means any physical format that could contain a work, such as a manuscript, microform, digital medium, or any other formats. As an example, Sahih Al-Bukhari is a work realised in the Arabic alphabet, embodied in a manuscript format.

Fourth entity: Item "is a single example of a particular manifestation" (Buchanan, 2006). An item is an exemplar of a specific physical object, such as a copy autographed by the author. An item is owned by person/s or corporate body - identified by object, event, place, or/and concept  (International Federation of Library Associations, 2009). As an example, *Sahih Al-Bukhari* is a work realised in the Arabic alphabet, embodied in a manuscript format, exemplified by a manuscript copy with a recall number ###*.

| Work | Sahih Al-Bukhari |
|---|---|
| *Is realised through* | |
| Expression | Arabic alphabetic and language |
| *Is embodied in* | |
| Manifestation | Handwritten manuscript |
| *Is exemplified by* | |
| Item | Manuscript No:### |
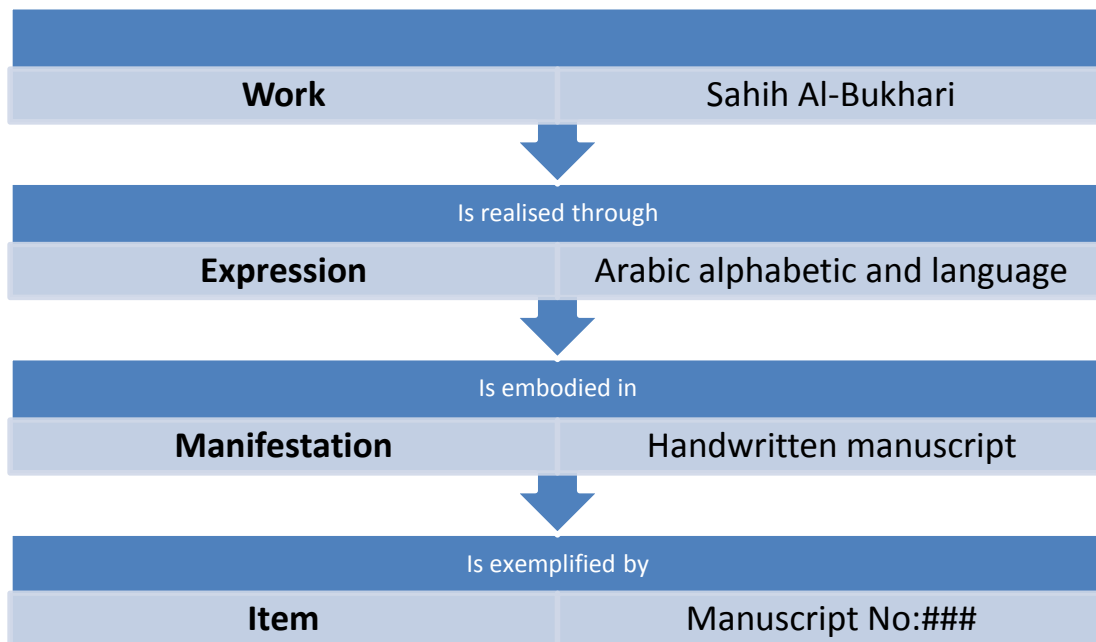
**Figure 3-9: FRBR Model for Arabic Manuscript**

In addition, using the FRBR in the context of Arabic manuscripts can create relationships between Works (W), Expressions (E), Manifestations (M), and Items (I) of Arabic manuscripts. The relationship between the four entities can be demonstrated in the following example:

- o W1    *Sahih Al-Bukhari*

    - ▪ E1       Arabic text

    - ▪ E2       Translated into English text

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- M1      Handwritten text in a manuscript

- M2      Scanning of handwritten text on CD-Rom

   o I1      Bound manuscript no:###

   o I2      CD-Rom no:### held by KFNL

A discussion of the relationship between work-to-work has been presented in FRBR (International Federation of Library Associations, 2009). This relationship can be applied to map different works, if those works have been judged sufficiently well in relation in their contents. Therefore, it can be applied to Arabic manuscripts that have taken a centric approach to authorship on the grounds that the generated work is a "significant degree of independent intellectual or […] effort", such as " abstracts, digests and summaries [which] are also considered to represent new works" (International Federation of Library Associations, 2009). It is worthy of note that a generated work using a centric approach of authorship is considered to be a new centric work.


For example:

- W1   *Sahih Al-Bukhari* (CW)

   Has been explained in:

- W2   *Fath ul-Bari fi Sharh Sahih al-Bukhari* (GW)

However, as mentioned above, language is considered as an expression of a work, a translated work into another language is considered "as different expressions of the same original work" (International Federation of Library Associations, 2009). Moreover,

any revision, or update to, for instance, original text in a manuscript (e.g. original author Arabic manuscript) is considered as new expression of the same work:

> *" ...[V]ariant texts incorporating revisions or updates to an earlier text are viewed simply as expressions of the same work (i.e., the variant texts are not viewed as separate works). Similarly, abridgements or enlargements of an existing text, or the addition of parts or an accompaniment to a musical composition are considered to be different expressions of the same work. Translations from one language to another, musical transcriptions and arrangements, and dubbed or subtitled versions of a film are also considered simply as different expressions of the same original work."* (International Federation of Library Associations, 2009).

For example:

- W1 *Sahih Al-Bukhari*
    - E1 Text translated into English by Muhammed Muhsin Khan
    - E2 A revised autograph by the main author

If an Arabic manuscript has been edited in theses, and/or book form, it is considered to be a new expression of a work.

For example:

- W1 *Fath ul-Bari fi Sharh Sahih al-Bukhari*
    - E1 Original Arabic text

▪  E2     Text edited by AbdulAziz Ibn Baaz

As mentioned previously, the FRBR Model Group 1 can be applied as a conceptual model for Arabic manuscripts. If the FRBR Model Group 3 Entities and Subject Relationships (Figure 3-10) is used for developing descriptions of Arabic manuscripts, this could aid in recognising most of the characteristics which still present difficulties in cataloguing and describing Arabic manuscripts, even using the current rules in most libraries in the Arab world. It is believed by this researcher that a more accurate examination of the FRBR for application to characteristics and patterns of Arabic manuscripts should be integrated into one of the available systems or software, as Buchanan (2006) did when he examined Greenstone as a form of digital library software.
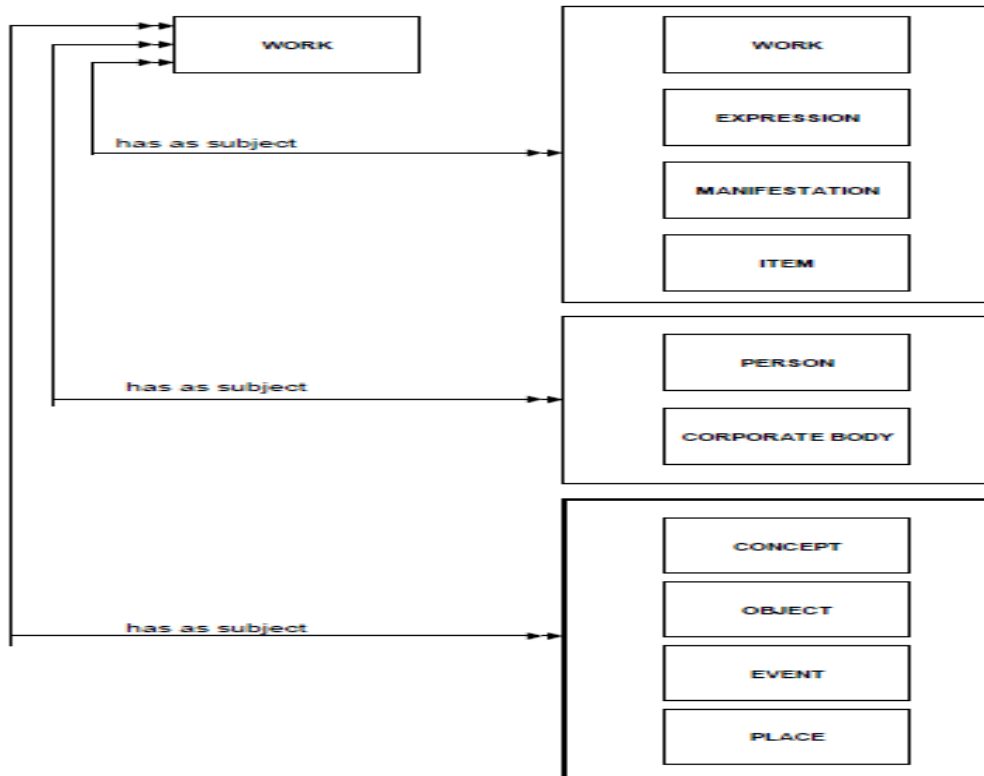
**Figure 3-10: The FRBR Model Group 3: Entities and Subject Relationships**

## 3.6 Summary

In conclusion, attention has recently been paid to the digitisation of Arabic manuscripts and making them available via, for instance, digital libraries. However, studies of users and users' needs and requirements are still relatively limited. With regard to specifying users' needs and requirements for establishing a digital library of Arabic manuscripts, this is virtually non-existent. Therefore, this study seeks to bridge the gap between Arabic manuscript users and digital libraries of Arabic manuscripts, by exploring and specifying end-users' requirements and highlighting the most common requirements of users (providers and end-users) for scholarly use in editing Arabic manuscripts in KSA, in order to provide best practice for a digital library of Arabic manuscripts. By examining the four primary entities of FRBR model and its relationships as a conceptual model for Arabic manuscripts in a digital library, it has been shown that these can accommodate and present prolific authors' works, as well as their existence in different versions and/or formats.

# CHAPTER FOUR RESEARCH METHODOLGY

## 4.1 Problem Statement

As previously mentioned (on page 8), specifying and identifying user requirements should be taken into consideration in the establishment and development of digital libraries at every stage of the process (i.e. planning, designing, evaluating) (Borgman, 1999) (Tedd and Large, 2005b) (Theng et al., 1999). In addition, specifying user requirements for the humanities has become a matter of some import as requirements have changed since the advent of the digital era, and these should therefore be taken into account in the planning of a digital library (Benardou et al., 2010; Buchanan et al., 2005; Rimmer et al., 2008). Specifying user requirements for a digital cultural heritage may become more important as a result of the attitudes and behaviour of its users (Crane, 2002) (Liew, 2005)), and the features and characteristics of the materials (i.e., Arabic manuscripts in this present research,) must also be taken into consideration, (Alshuhri, 2008). In order to establish a digital library for Arabic manuscripts, a deep understanding of user requirements is required. Therefore, this study aims to explore the requirements of Arabic manuscript providers and end-users for establishing a digital library for Arabic manuscripts, particularly for academic purposes, such as performing codicology and palaeography (i.e. editing) of Arabic manuscripts in the KSA and according to the findings of this exploration, to make recommendations for a best practice in establishing and developing such libraries.

## 4.2 Methodology Overview

This chapter addresses the research methodology used in order to achieve the research objectives, answer the research questions, which will lead to fulfilling the aim of the research. The term "methodology" refers to all methods, techniques, strategies, and tools used to understand the research problem or answer the research questions (Walliman, 2011).   A distinction has been made between two terms: "research methodology" and "research methods", which are used frequently in the research literature. Walliman (2011) defines research methods as a range of tools, techniques, methods, for conducting research. Similarly, Kothari (2005) states that research methods include all methods and techniques used by researchers for conducting their research. However, Creswell & Plano Clark (2007) specify research methods as the techniques of data collection and analysis used; for instance, standardised instruments for quantitative research.

Research methodology has a wider meaning than that of research methods, in that research methods constitute a part of research methodology (Kothari, 2005). Research methodology, according to Given (2008),

> *"consists of the assumptions, postulates, rules, and methods—the blueprint or roadmap—that researchers employ to render their work open to analysis, critique, replication, repetition, and/or adaptation and to choose research methods".*

Therefore, research methodology can be defined as a framework that connects with the entire process of the research (Creswell and Plano Clark, 2007) as a central influence.

Another term frequently used in the research literature is "research design". Research design refers to a *"plan of action that links the philosophical assumptions to specific methods"* (Creswell and Plano Clark, 2007). Therefore, quantitative, qualitative, experimental, and mixed methods researches are all forms of research design. The research methodology of this study is illustrated in (Figure 4-1) and explained below.
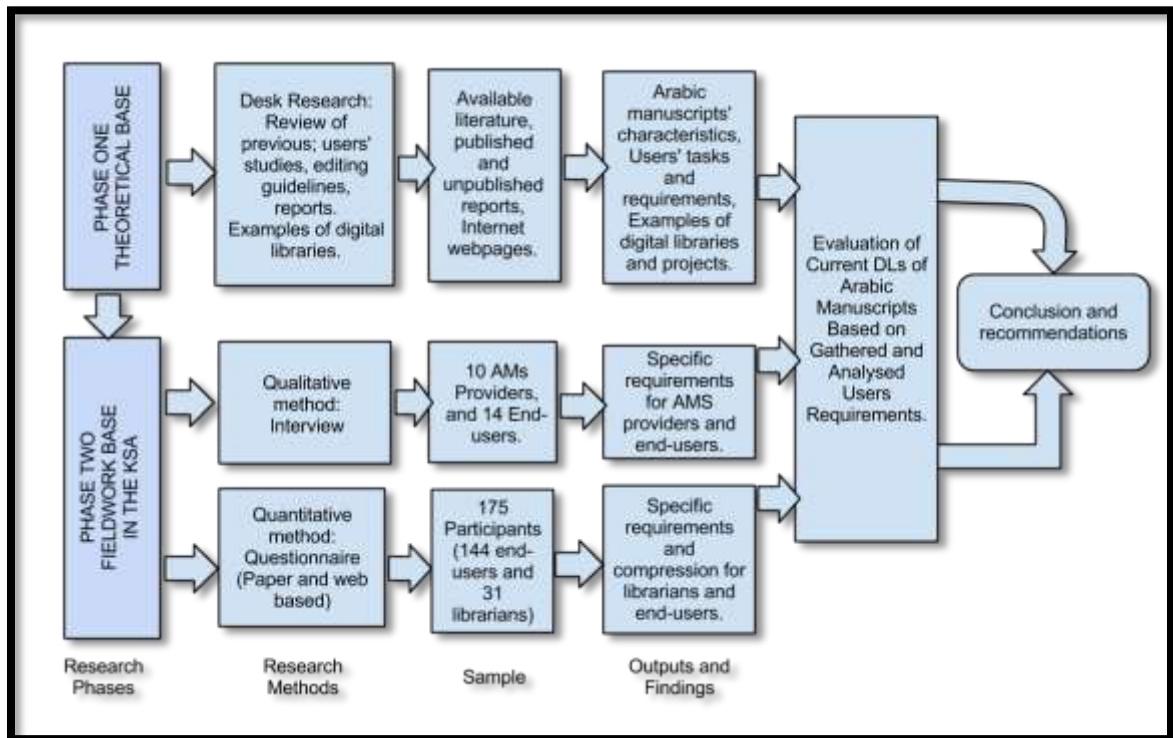


**Figure 4-1: The Research Methodology**

### 4.2.1  Research Environment

This study has selected the KSA as the study field; firstly because it holds a large collection of Arabic manuscripts. According to the Directory of Libraries and Information Centers in the KSA, which was issued by King Fahad National Library (KFNL) in 2007, there were 226,804 manuscripts recorded in the KSA's libraries, archives, and information centres (King Fahad National Library, 2007). Second, due to the revival of Arabic cultural heritage in academic programmes and the commercial publishing of Arabic manuscripts from inside and outside the KSA, there is a great demand for access to these manuscripts. According to (Abd Al-Jabbar, 2006), from 1970 to 2000, there were 1,341 academic degrees based on edited Arabic manuscripts have been awarded by five KSA universities. Third, the Fifth Plan of Scientific and Technical Information made a recommendation in 2004 to establish digital libraries of Arabic manuscripts in educational and governmental institutions. This plan was produced by King Abdulaziz City for Science and Technology. Finally, a number of the original Arabic manuscripts in the libraries in the KSA have been digitised by the King Fahad National Library (KFNL) under the auspices of the Preserving National Cultural Heritage Project (PNCHP) (see page 75).

This research addresses the best practice to establish a digital library of Arabic manuscripts in the context of end-users' requirements and Arabic manuscript providers' requirements for academic purposes (e.g., editing) in the KSA. In addition, as mentioned in the previous chapter, a comparison between Arabic manuscripts and those in other

languages is outside the scope of this research. The principal features of Arabic manuscripts are described in the literature review (see 2.4.2, and 2.4.3 for further details).

As such, it may not be generalisable to other contexts (see 1.7 for further details). However, in the researcher's view, it is reasonable to assume that the findings may be transferable to any country conforming to similar criteria as the KSA, that is, a large collection of manuscripts, a need and demand for digital libraries of these manuscripts, support from the government or other relevant authority, and a ready environment (i.e., previous digitisation).

## 4.2.2 Research Design and Strategy

As stated previously, research design differs from research method. This study focuses on specifying the requirements of potential users of Arabic manuscripts. Therefore, the first step was to identify the expected users who should be involved in this study. Two broad categories of user domains are involved in this study, namely, providers of Arabic manuscripts as providers, and end-users of Arabic manuscript as consumers. Each domain has specific requirements according to their roles (i.e. provider or consumer) and it is these requirements that this research seeks to identify.

The research design was divided into two phases. Each phase employed specific research methods. The phases of this research were in sequential order and interrelated. Vanderstoep and Johnston (2009) report that research methods are classified into two broad groups; qualitative and quantitative. They distinguish between these methods, as

demonstrated in Table 4-1. However, use of a combination of these two methods (i.e. mixed methods) has become increasingly widely used in recent years, due to advantages that could be obtained by using two methods rather than only one (for further discussion on mixed methods, see . on page 121).

**Table 4-1: Qualitative Research Method Vs. Quantitative Resarch Method**

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

Adapted from (Vanderstoep and Johnston, 2009).

In the literature on this subject, several methods have been used to elicit potential user requirements. Martin and Nigel (2002) reported a number of tools for gathering data, such as questionnaires, interviews, focus groups, etc.  These tools consist of a

combination of qualitative and quantitative methods. Therefore, the combination of integrated qualitative and quantitative approaches as mixed method is the most appropriate research design that can be used in this study. Some studies in the field of digitisation of cultural heritage have utilised a combination of methods to collect their data, such as:

- Review of User Requirements for Digitised Resources in Islamic Studies. By, Auchterlonie, P., & Abu-Zayed, A. (2008) (report). This is a project funded by JISC to digitise Islamic resources (e.g. Arabic manuscripts) in the UK. Questionnaires, focus group, and interviews were used as methods to gather data.

- Cultural and historical digital libraries dynamically mined from news archives: User Requirements Specification. By Mergoupi-Savaidou, E., Katifori, A., & Tympas, A. (2008) (report). This is a project co-founded by the European Commission to design a digital library of cultural heritage. Questionnaires, interviews, and scenario use cases were all employed to investigate user needs and requirements.

However, some studies utilised a mono method to identify user requirements. For example, in their study, Chamnongsri et al. (2010) conducted 20 interviews to determine the requirements of users of palm leaf manuscripts in Thailand. Kimani et al (2005) used a questionnaire to explore the requirements of providers and end-users of Arabic manuscripts for digital libraries in general. The study by Kimani et al (2005) is a part of project by the Network of Excellence on Digital Libraries, named DELOS, which is funded by the European Commission.

This study is framed by specifics: materials (i.e. Arabic manuscripts), users (i.e. manuscriptologists), purposes (i.e. scientific and academic). The selected research design illustrated in (Figure 4-1) was adopted. Logically, the first phase for building a comprehensive knowledge about the research topic was the theoretical. Moreover, surveying the available literature could assist in finding out some related issues to the studied topic (Kothari, 2005). The second related phase was conducting fieldwork to elicit the requirements of potential users. Gray (2004) suggests that exploratory research should include searching the available literature and then engaging with the experts in the field. Previous mentioned digital libraries of Arabic manuscripts (see page 85) have been evaluated based on the results of Phase One and Two (see Chapter Seven, page245).

### 4.2.2.1 Phase One: Theoretical Base

The theoretical base phase was mainly to develop a deeper knowledge of the subject (Gray, 2004). In the context of this study, desk research means obtaining knowledge about the research topic via the available literature. Moreover, number of primary and secondary resources (e.g. see Chapter Two, Section 2.5) has been analysed in this study in order to figure out:

- Characteristics of Arabic manuscripts,

- Tasks which users may be engaged in when editing Arabic manuscripts,

- Findings from previous user studies for digital libraries with regard to cultural heritage in general and Arabic manuscripts in particular,

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- Examples of existing digital libraries of Arabic manuscripts around the world and in the KSA,

- Considerations for establishing digital libraries of Arabic manuscripts.

There are some studies and text-books that address Arabic manuscript characteristics and patterns, was explained in (on page 34). Moreover, there are a number of text-books and guidelines for scientific and academic editing of Arabic manuscripts. These text-books and guidelines (e.g. (Harun, 1965; Ghiryani, 2006) (Ma`Ruf, 1982; Munajjid, 1987) can be used to formulate a series of general user tasks to be taken into consideration when specifying user requirements. For example, manuscriptologists need to define the variations between different copies of one Arabic manuscript title. This is known in the editing process as comparison of copies. For example, *Fath ul-Bari fi Sharh Sahih al-Bukhari* by *al-Hafith Ibn Hajar Al-Asqlani* exists in 60 manuscript apographs, which were all written by hand (on page 36). Therefore, it is valuable for an editor to browse a number of these copies, according to certain criteria, in order to determine the similarities and differences between them. This process can be facilitated by providing the ability to display more than one manuscript on the screen, as well as inserting notes or annotations.

Although the number of studies that have addressed the user-centred aspect of digital libraries for cultural heritage are limited (Chamnongsri et al., 2010; Rimmer et al., 2008) (Further details was discussed at3.4.8), a few studies have provided outlines and recommendations for establishing digital libraries for cultural heritage materials generally

and for Arabic manuscripts specifically. (Auchterlonie and Abu-Zayed, 2008) highlight the necessity of integrating knowledge via providing a number of resources.  Reports issued by Arabic manuscript providers in the KSA were reviewed and used to enrich data, discussion, and findings of this research.

This phase is presented in Chapters Two and Three in this research. Moreover, this phase is associated and integrated into the data analysis and interpretation of the second phase and evaluation of digital libraries of Arabic manuscripts (Fieldwork Base) in Chapters Five, Six, and Seven ref of this study. An evaluation of studied digital libraries of Arabic manuscripts (see 3.4 for further details) is discussed (on page 150) and summarised in (Chapter Seven;245).

### 4.2.2.2 Second Phase: Fieldwork Base

This phase focuses on the gathering, analysis, and interpretation of data from the field of the study community and environment. This study aims to specify user requirements for establishing a digital library of Arabic manuscripts in the KSA. As mentioned previously, a combination of qualitative and quantitative approaches (i.e. mixed method) were utilised for specifying and identifying users' requirements. This research has applied a mixed method approach for data collection, analysis, and interpretation. A brief description of mixed methods and types is described below.

Creswell (2009) defines mixed methods research as *"an approach to inquiry that combines or associates both qualitative and quantitative forms"*. Creswell & Plano Clark

(2007) emphasised that mixed method research links philosophical assumptions [research methodology] with methods of inquiry [research methods]. Therefore, mixed methods research involves more than merely collecting and analysing both qualitative and quantitative data. (Tashakkori and Teddlie, 2003) considered mixed method to be a third research design alongside the two better-known designs (qualitative and quantitative).

Mixed method research has become more popular in the last 20 years ((Gorman and Clayton, 2005); (Creswell and Plano Clark, 2007); (Creswell, 2009); (Tashakkori and Teddlie, 2003). A number of authors (e.g. (Tashakkori and Teddlie, 2003); (Greene et al., 2005); (Creswell and Plano Clark, 2007) have attributed the use of the mixed method approach by researchers as being due to this approach "*provid[ing] a better understanding of research problems than either approach alone*" (Creswell and Plano Clark, 2007). Greene et al. (2005) summarised the purpose of using the mixed method approach under the umbrella of better understanding:

> *" (1) understanding more defensibly, with stronger validity or credibility and less known bias, as with the classic approach of triangulation; (2) understanding more comprehensively, developing more complete and full portraits of our social world through the use of multiple perspectives and lenses; (3) understanding more insightfully, with new ideas, fresh perspectives, creative concepts and meanings, as when findings diverge and thus require reconciliation via further analysis, reframing or some other shift in perspective; and (4) understanding with greater value consciousness and with greater diversity of values, stances and positions through the inclusion of different methods that themselves advance different values"* (Greene et al., 2005).

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Four types of mixed method design were reported by (Creswell and Plano Clark, 2007; Creswell, 2009). The selection of one these types is made according to the stages of data collection, analysis, and interpretation.

- Triangulation Design: this is a one-phase design for implementing both quantitative and qualitative methods simultaneously.

- Embedded Design: this involves embedding one method within another one (e.g. embedding qualitative in quantitative) at the stage of data collection, and giving emphasis to one method at the interpretation stage.

- Explanatory Design: this is a mix of the two methods in sequential order; for instance, conducting quantitative data collection, analysis, interpretation, followed by the qualitative method to explain the results of the first method.

- Exploratory Design: this is a design in which one method leads to another to explore the studied phenomena. This design is conducted in two sequential stages. Therefore, for example, a qualitative method may be conducted, followed by a quantitative method for exploration of the studied topic (Creswell and Plano Clark, 2007).

After careful consideration of these four types of mixed method, the researcher decided to employ triangulation in this study. This design has been used to explore user requirements in a number of studies (Auchterlonie and Abu-Zayed, 2008; Mergoupi-Savaidou et al., 2008). In the case of this study, the triangulation design was considered to be a suitable option, for a number of reasons. One of these is that this study focus on

two different groups, each of which has specific requirements, according to their roles and tasks. Triangulation gives the researcher the opportunity to discover contrasting and interrelated results, thus gaining a deeper understanding of the studied phenomena (Creswell and Plano Clark, 2007; Tashakkori and Teddlie, 2003). In this respect, Morse (1991) suggests that triangulation is suitable for research in which there is limited interaction between the two sources of data during the data collection stage, but where the findings complement one another at the data interpretation stage, which is the case in this present research. Further, Jick (1979) notes that triangulation permits researchers to be more confident of their results and can lead to thicker, richer data. In In addition, the validity of a study is enhanced by the use of triangulation, validity referring to whether the findings of a study accurately reflect the situation, and are supported by the evidence (Golafshani, 2003).

## 4.3 Data collection tools

As previously stated, this research employed a triangulation mixed method design, which involves the merging of qualitative and quantitative methods. Two methods were used in phase two to gather the research data. The first method was qualitative, in which a face-to-face semi-structured interview instrument was utilised. A quantitative method was then used. A questionnaire survey was used to gather the quantitative data. The explanation for this is as follows.

## 4.3.1 Interview

An interview is a direct conversation between people, conducted by a person in role as researcher (Gray, 2004). Therefore, "*Interviewing is a powerful way of helping people to make explicit things that have hitherto been implicit to articulate their tacit perceptions, feelings and understandings*" (Arksey and Knight, 1999). Interviews are a relatively common way of collecting data in research, and the data they collect and the forms they take are limited only by the requirements of the research question and the related research design. To answer some of the questions of this study, it was felt that using interviews would assist in capturing certain details and clarifications required for this research. The interview, as mentioned previously, was one of the data collection tools used in the work of (Auchterlonie and Abu-Zayed, 2008; Mergoupi-Savaidou et al., 2008; Chamnongsri et al., 2010) to explore and specify user requirements.

There are three main types of interview: the structured interview, the semi-structured interview, and the unstructured interview. An unstructured interview attempts to draw out information, attitudes, opinions, and beliefs about particular themes, ideas, and issues, without the aid of predetermined questions. To achieve this, interviewers use a more conversational style and attempt to prompt, probe, and develop questions on the spot as appropriate to the ongoing conversation (O'leary, 2004).

Semi-structured interviews are not standardised. According to Gray (2004): "*for this type of interview, the interviewer has a list of issues and questions to be covered, but may not deal with all of them in each interview*". The order of the questions may also

change depending on what direction the interview takes. As new issues arise, additional questions may be asked, including some which were not anticipated at the start of the interview. Gray (2004) states that this type of interview allows for probing views and opinions where it is desirable for respondents to expand on their answers.

A structured interview may include open-ended and closed-ended questions. This type of interview is usually used for large projects for which the researcher wants the same data to be collected from each respondent (Lavrakas, 2008). Table 4-2 shows the characteristics of structured, semi-structured, and unstructured interviews.

**Table 4-2: Characteristics of structured, semi-structured, and unstructured interviews**

| Structured interview | Semi-structured interview | Unstructured interview |
|---|---|---|
| Quick to capture data | Slow and time-consuming to capture and analyse data | As semi-structured |
| Use of random sampling | The longer the interview, the more advisable it is to use random sampling | Opportunity and snowball sampling often used. In organisations, targeting of 'key informants' |
| Easy to analyse | Quantitative parts easy to analyse | Usually hard to analyse |
| Tends to positivist view of knowledge | Mixture of positivist and non-positivist | Non-positivist view of knowledge |
| Respondents' anonymity easily guaranteed | Harder to ensure anonymity | Researcher tends to know the informant |

Source: Adapted from Arksey and Knight (1999)

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

- They are less intrusive to those being interviewed, as the semi-structured interview encourages two-way communication between interviewer and interviewees.

- Semi-structured interviews enable the interviewer to capture unexpected issues and information.

- Semi-structured interviews enable flexibility by including some open-ended questions.

- Semi-structured interviews have been widely used by studies to identify information seeking behaviour in the field of humanities (e.g. (Buchanan et al., 2005) (Rimmer et al., 2006)), and for specifying user requirements (e.g. (Auchterlonie and Abu-Zayed, 2008; Mergoupi-Savaidou et al., 2008); (Chamnongsri et al., 2010)).

As stated previously, this research targeted two groups: Arabic manuscript providers of Arabic manuscripts in the KSA, and end-users (i.e. manuscriptologists). Therefore, two separated semi-structured face-to-face interviews were conducted with sample of providers of Arabic manuscripts, and end-users.

**4.3.1.1 Interviews with providers of Arabic manuscripts**

Ten face-to-face semi-structured interviews with providers of Arabic manuscripts were carried out in October and November 2009. These interviews aimed to explore and specify the requirements of providers of Arabic manuscripts. These interviews were categorised into four sections: 1.Investigating the status of Arabic manuscripts and related issues at each interviewed provider. 2. Identifying roles, tasks and services that are provided by each interviewed provider. 3. Collecting data on previous digitisation projects and the attitude of interviewed providers of Arabic manuscripts toward establishing a digital library of Arabic manuscripts. 4. Specifying and identifying requirements of providers of Arabic manuscripts in order to build up a digital library of Arabic manuscripts with regard to administration, organisation, and service requirements.

In order to achieve these aims, each interviewee was asked fifteen questions individually (see Appendix A). The interviewees were all department directors. Each interview session lasted between 45 and 60 minutes.

**4.3.1.2 Interviewee sample**

In late 2007, KFNL issued a Saudi Libraries and Information Centres Directory (SLICD), which covered the collections of libraries and information centres. The directory indicates that there were a total of 226,804 Arabic manuscripts in the KSA's libraries and information centres (see Appendix E). There are 95 libraries and information centres that store Arabic manuscripts (see Table 4-3).

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**Table 4-3: Arabic Manuscripts Holdings in KSA's Libraries**

| Library Type | No. of Libraries | Total of AMSs | Total No. of Items in Libraries' Collections | Percentage (%) | AMSs Mean (μ) |
|---|---|---|---|---|---|
| Academic Libraries | 18 | 122,260 | 4,224,989 | 2.89% | **6792** |
| Public Libraries | 16 | 46,601 | 2,008,132 | 2.32% | **2913** |
| Special Libraries | 9 | 51,780 | 300,162 | 17.25% | **5753** |
| School Libraries | 51 | 1963 | 179,450 | 1.09% | **38** |
| National Library | 1 | 4200 | 3,021,901 | 0.14% | **----------**[20] |
| Total | 95 | 226,804 | 9,734,634 | 2.33% | **2368** |

The Directory reveals that Arabic manuscripts are held in academic, public, school, and special libraries, as illustrated in Table 4-3). A non-probability sampling technique was applied. Ten providers of Arabic manuscripts were selected to conduct the study for the following reasons:

- There is a considerable variation in the number of Arabic manuscripts and averages (μ) $\mu = \sum X \dfrac{\square}{N}$ of the KSA providers of Arabic manuscripts as demonstrated in Table 4-3.

- The number of providers of Arabic manuscripts in the study population is fairly high (95), and they are distributed geographically between various cities and villages in the KSA.

- The largest number of providers of Arabic manuscripts is in the school library group (51), according to the directory, and the number of Arabic manuscripts ranges from 1 to 470. School libraries do not generally provide academic and

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[20] No mean can be given as there is only one set.

research services for scholarly purposes, so they have been excluded from the study.

- The objective of the study is to reveal the requirements of providers of Arabic manuscripts who are likely to have the intention of establishing a digital library for Arabic manuscripts, and are interested in providing access to Arabic manuscripts for scholarly purposes (e.g. academic, special, public, and national libraries).

Therefore, the sampling standard is the objectives and missions of the providers of Arabic manuscripts. These objectives and missions refer to the aims of the providers of Arabic manuscripts in providing access to Arabic manuscripts, with the principal objective of supporting scholarly purposes. School libraries were excluded from the study for the reason cited above. Five academic libraries are included in the study, as is one special library and the National Library. Three special libraries are included in the study, one public library, and the King Fahad National Library. These ten libraries were chosen as they have the largest collections in the KSA, and state in their profiles that they are involved in editing and studying Arabic manuscripts. These ten providers of Arabic manuscripts in the convenience sample (Table 4-4) hold 204,466 Arabic manuscripts, which equal 90% of the total Arabic manuscripts held in the KSA. This is discussed further in Chapter Five.

**Table 4-4: The Ten Interviewed Providers of Arabic manuscripts**

| Provider | Type[21] | City | No. of AMSs | URL |
|---|---|---|---|---|
| KFNL | National | Riyadh | 4200 | http://www.kfnl.gov.sa/ |
| KAAUL | Academic | Makkah Al Mukarramah | 5000 | http://uqu.edu.sa/lib/en |
| PSL | Academic | Riyadh | 21,129 | http://ksu.edu.sa/Deanships/library/Pages/Home.aspx |
| CL-AIMISIU | Academic | Riyadh | 21,998 | http://library.imamu.edu.sa/index.html |
| CL-IU | Academic | Al Madinah Al Munawwarah | 23,638 | http://iu.edu.sa/web/content.aspx?id=303 |
| CL-KAU | Academic | Jeddah | 5000 | http://library.kau.edu.sa/Default.aspx?site_id=212&lng=EN |
| KFCRIS | Special | Riyadh | 51,501 | http://www.kfcris.com/index_en.php?page=e-home |
| NPML | Special | Al Madinah Al Munawwarah | 5400 | http://www.mktaba.org/ |
| KAPL | Public | Riyadh | 8600 | http://www.kapl.org.sa/eindex.php |
| LSAC[22] | Special | Riyadh | 13,000 | http://www.albabtaincenter.com/index.php |
| Total | | | 204,466 | |

### 4.3.1.3 End-user Interviews

Fourteen face-to-face semi-structured interviews were conducted with a sample of the main end-users of Arabic manuscript (i.e., academics, post-graduate students, and independent researchers). The objective of these interviews was to collect data and information associated with end-users' requirements, previous experience, and expected affordances of technology or services that may be provided by digital libraries of Arabic

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[21] . These have been categorised according to the Saudi Libraries and Information Centres Directory (SLICD).
[22] . A charitable organisation interested in Arabic manuscripts.

manuscripts. Such data is crucial for establishing and/or developing a digital library for Arabic manuscripts in the KSA.

The interview sessions took place in October and November 2009. The interviews were conducted face-to-face by arrangement through a brief introduction made by telephone or e-mail. Each interview session lasted between 30 and 45 minutes.

The interviews were categorised into two main themes based on the use of Arabic manuscripts by participants: in the real-world and in the virtual world. That is, the purpose of the interviews was two-fold. That is, the researcher attempted through the interviews to explore end-users' 'real-world' activities and information needs in terms of using Arabic manuscripts, in line with Martin and Nigel's (2002) assertion that interviews helped the developers to identify the users' tasks and roles. Further, the interviews were used to attempt to determine the users' requirements when using a digital library (i.e. 'virtual world' activities) with a view to fulfilling their needs in this regard, and hence to contribute to fulfilling the second research objective. According to Maguire et al (1998), interviewing remains the most widely used method of determining what users want. Furthermore, Bryman and Bell (2003) state that not only does interviewing allow the opportunity to gather data that is 'rich', it provides the opportunity for interviewees' to develop their point of view fully. Each end-user interviewee was asked seven questions (see Appendix B).

## 4.3.1.4 End-user Interview Sample

**Table 4-5: End-user interviewees**

| ID | Position | Degree | Speciality | Approx. no. of years of experience |
|---|---|---|---|---|
| **P1** | University staff member | PhD | Islamic Studies | 20 |
| **P2** | University staff member | PhD | Islamic Studies | 12 |
| **P3** | University staff member | PhD | History | 22 |
| **P4** | University staff member | PhD | Arabic language and literature | 10 |
| **P5** | University staff member | PhD | Arabic language and literature | 9 |
| **P6** | Independent researcher | PhD | Arabic language and literature | 15 |
| **P7** | Independent researcher | PhD | History | 10 |
| **P8** | Independent researcher | MA | Islamic Studies | 5 |
| **P9** | Post-graduate student | MA | Islamic Studies | 3 |
| **P10** | Post-graduate student | MA | Islamic Studies | 5 |
| **P11** | Post-graduate student | MA | History | 3 |
| **P12** | Post-graduate student | MA | History | 2 |
| **P13** | Post-graduate student | BA | Arabic Language and Literature | 3 |
| **P14** | Post-graduate student | BA | Arabic Language and Literature | 1 |

Due to the Arabic manuscript end-user population size being unknown, a volunteer sample (i.e. non-probability) type was chosen for the interviews with Arabic manuscript end-users in the KSA. Lack of comprehensive records of postgraduate students studying Arabic manuscripts at universities in the KSA led to this type of sampling being chosen. For instance, during the field trip, there were only 23 PhD students at three KSA universities in 2008-2009 who had selected editing Arabic manuscripts as the topic of their thesis. This information was recorded by just two universities in KSA. In the light of this, fourteen interviewees representing the three main categories of potential Arabic manuscript users (i.e. university staff members, independent researchers, and higher education students) were selected (Table 4-5). They were selected through the researcher's personal contacts. Fourteen is considered to be adequate for several reasons. Firstly, the fourteen interviewees are categorised into three groups of expected end-users of a digital library of Arabic manuscripts for academic purposes (i.e. five university staff members, three independent researchers, and six postgraduate students with a variety of experience years as illustrated in Table 4-5). As it is qualitative data which is gathered through these interviews, provided the sample represents the characteristics of the study population, the number is less important than it would normally be in the collection of quantitative data. In this respect, O'Leary (2004) asserts

> *"There are, however, researchers who wish to gather qualitative data AND*
> *represent a defined population with some level of confidence, but they are*
> *often unsure how to do this because the nature of collecting qualitative*

*data generally limits sample size. In this case, rather than rely on numbers, it will be up to the researcher to logically argue that their sample captures all the various elements/ characteristics of the population under study",* (p104).

In addition, some previous studies have selected the same sample number, such as Rimmer et al. (2008), or fewer, such as Auchterlonie and Abu-Zayed (2008). Further, Morse (1995, p. 47) notes that, for interviews "there are no published guidelines or tests of adequacy for estimating the sample size required". Similarly, Guest et al. (2006) are of the view that a sample of six interviews may be sufficient to enable the development of meaningful themes and useful interpretations. Nonetheless, although for the aforementioned reasons, the researcher considers fourteen to be an adequate sample, it is likely that he would have conducted interviews with a larger sample, had this been practical. However, it should be noted that the interviews have a limitation in that, although they provided insightful information of the requirements of the sample of end-users who represent the principal end-users of digital libraries of Arabic manuscripts, i.e. those who use them for scholarly and academic purposes (e.g. university staff members, students, independent researchers), the findings cannot be generalised to any other group of end-users.

## 4.3.2 Interview Data Analysis

As recommended by (Creswell, 2009), an interview summary was produced to record practical details about the time and place, the participants, and the duration of the interview, etc., as well as the responses. In addition, all interview sessions were fully recorded ((Gorman and Clayton, 2005) by Digital Voice Recorder (OLYMPUS). Interviewees agreed to participate in face-to-face interview sessions and to have them recorded. After each session, the recorded interview was transcribed verbatim (Creswell and Plano Clark, 2007; Given, 2008)in the language of the interview (Arabic). The data has been coded according to theme (Gorman and Clayton, 2005) (see Appendix C). The themes are categorised into administrative, organisational, and service requirements. An external member (university staff member, PhD holder, in Library and Information Science) was asked to check the gathered data and coding of the themes. The representation of data analysis is presented in (Chapter Five, page 154) ; the quotations of significant statements by interviewees are organised by theme (Creswell and Plano Clark, 2007).

### 4.3.3 Questionnaire Survey

The questionnaire is the second represented data collection of this study. As mentioned previously, the study employed a triangulation mixed methods design in the second phase (on page 121). According to (Brace, 2008), the role of the questionnaire is to obtain the information that is required to enable the researcher to achieve the objectives of the survey. The desired objectives of the questionnaire survey are obtaining a broader range of data from end-users and librarians (i.e. providers of Arabic manuscripts). In addition, the purpose of conducting questionnaire survey is also to examine pre-defined digital library requirements and services that have been extracted from previous literature and existing digital libraries of Arabic manuscripts (see Design of the Questionnaire below). Furthermore, the questionnaire survey endeavours to present comparisons between the two participant groups (i.e. end-users and librarians).

Two types of questionnaire were designed to collect the required data and information. The first questionnaire was paper-based, while the second was web-based. The advantages of using paper-based questionnaires, as confirmed by (Brace, 2008), lie in the fact that with a paper-based questionnaire, respondents have time to consider their answers; in addition, respondents can write lengthy and full answers to open questions if they wish to do so. (Brace, 2008) states that one disadvantage of using paper-based questionnaires lies in relation to the time offered to respondents.

> *"Having time to consider answers, whilst often an advantage, is not always what the questionnaire writer wants. With attitudinal and image*

*questions, it is often the first reaction that is sought, rather than a considered response"* (Brace, 2004).

The second type of questionnaire, as mentioned earlier, was web-based. This was designed in the same way as the paper-based questionnaire, and every participant was given the option to fill in either the paper-based or web-based questionnaire. A number of studies have reported that web-based questionnaires have advantages that could be of benefit to this research:

- Collapsing physical space between the researcher and respondents (Huffman, 2006).

- Speed and timeliness of distributing and gathering responses (Hayslett and Wildemuth, 2004; Sue and Ritter, 2007).

- Offering convenience to participants, such as the ability to answer at a convenient time (Evans and Mathur, 2005).

Moreover, Perkins (2004) suggests that web-based surveys are appropriate in library and information science research.

Nonetheless, the researcher had to take care to avoid the potential problems involved in online surveys. Martins (2010) points out that as online surveys are self-administered, if any instructions are unclear, respondents may misunderstand and give irrelevant responses or become frustrated and abandon the survey. The researcher attempted to avoid this issue by conducting a pilot test prior to activating the main survey online (see 4.3.3.2). Dragow and Schmidt (2002) note that some respondents may have

concerns about confidentiality issues in the completion of an online survey. To avoid this potential problem, the researcher assured the respondents that the site was secure and the confidentiality of their responses would be respected. In addition, however, this matter was not as great an issue in this case as it may have been had the subject matter of the survey been a particularly sensitive personal one. Martins (2010) also suggest that respondents may not have the IT skills required to complete an online survey, but the researcher fekt this to be unlikely, as the respondents were all required to be computer-literate for their profession. Moreover, the paper-based survey was available to any respondent who preferred it.

The questionnaire was hosted by Smart-Survey.com: http://www.smart-survey.co.uk/. Smart-survey supports an Arabic language interface; therefore, it was a logical option. Some facilities were utilised, such as skip logic of Q10 and Q12.

The paper-based questionnaire was distributed during October 2009 at all ten of the aforementioned libraries in the study (2.6.2) and participants were accorded four months (Oct-2009 to Jan-2010) to complete return it. Similarly, the web-based questionnaire was launched in October 2009 and was available for four months (Oct-2009 to Jan-2010).

### 4.3.3.1 Design of the Questionnaire

A set of guidelines (Given, 2008) was followed, to ensure that the questionnaire was well-designed, specifically in terms of wording and question types. The following are some of the guidelines:

- Questions should use simple vocabulary.

- Their syntax should be simple, without subordinate clauses.

- Questions must be concrete with respect to time and events.

- They should not lead the respondents to particular answers.

- The number of response alternatives should be limited unless additional visual cues are employed.

The questionnaire was comprised of various questions to acquire data, as demonstrated in Table 4-6.

**Table 4-6: Research Questions and Corresponding Questions in the Questionnaires**

| Research Questions | Question No |
|---|---|
| **Demographic and background data** | 1 to 7 |
| **ICT skills, Internet usage, Arabic manuscripts on the internet** | 8 to 16 |
| **User requirements of a digital library for Arabic manuscripts** | 17 to 22 |

The questionnaire consists of 22 questions in three main sections (see Appendix D). The 22 questions designed based on Kimani, et al. (2005) study for eliciting users' requirements for a establishment of a digital library (Kimani et al., 2005). However, modifications have been occurred due to; 1) type of participants (i.e. manuscriptologists), 2) type of material in the digital library (i.e. Arabic manuscripts). The first section is related to obtaining demographic data about respondents. These data are presented

gender, age, qualification, and occupation of participants. Characteristics of participants and their use of the Internet can be extracted from them their responses. The second section, ICT skills, internet usage, and Arabic manuscripts on the internet, is about the respondents' experience of searching and locating in the virtual world (e.g. a digital library). The third section relates to digital library functions for Arabic manuscripts. This section consists of seven questions.

**16)** Which of the following media do you prefer to use to browse Arabic manuscript as an alternative to the original form?

| | Like best | Like | No preference | Do not like very much | Do not like at all |
|---|---|---|---|---|---|
| Arabic manuscript image on digital media (e.g. CD-ROM, DL) | ◯ | ◯ | ◯ | ◯ | ◯ |
| Paper-based Arabic manuscript | ◯ | ◯ | ◯ | ◯ | ◯ |
| Arabic manuscript in microform | ◯ | ◯ | ◯ | ◯ | ◯ |

Question 16 relates to identify the subject's preferred Arabic manuscript surrogate. This question could lead us to find out whether the participants are ready to use recent digital surrogate.

**17)** To what extent do you consider the following elements important in the digital library of Arabic manuscripts?

| | Very Important | Important | No Preference | Less Important | Not Important |
|---|---|---|---|---|---|
| Arabic manuscript images | ◯ | ◯ | ◯ | ◯ | ◯ |
| Bibliographic data (metadata) of Arabic manuscripts | ◯ | ◯ | ◯ | ◯ | ◯ |
| Integrated e-forum, blog, wiki | ◯ | ◯ | ◯ | ◯ | ◯ |
| Federated search engine for libraries' OPACs | ◯ | ◯ | ◯ | ◯ | ◯ |
| Research tools (e.g. dictionaries, biographies, directories, references books, textbooks, atlases) | ◯ | ◯ | ◯ | ◯ | ◯ |

Question 17 seeks to explore the most important digital library functions in the opinion of the subject. (Kimani et al., 2005) reported three main functions of digital libraries: provision/access to resources, locating facilities, and integrated scholarly communications. (Mergoupi-Savaidou et al., 2008) discuss the necessity of providing secondary resources alongside the primary resources (e.g. Arabic manuscripts). The ability to conduct federated cross-searching of other libraries' OPACs was also added to the questionnaire for examination, as it was considered to have a significant impact on digital library functions.

**18)** How do you prefer to locate Arabic manuscript in a digital library?

| | Like Best | Like | No preference | Do not like very much | Do not like at all |
|---|---|---|---|---|---|
| Browsing by titles of Arabic manuscript titles | ⬤ | ⬤ | ⬤ | ⬤ | ⬤ |
| Browsing by subjects of Arabic manuscripts | ⬤ | ⬤ | ⬤ | ⬤ | ⬤ |
| Browsing by authors of Arabic manuscripts | ⬤ | ⬤ | ⬤ | ⬤ | ⬤ |
| Browsing by thumbnails of Arabic manuscripts | ⬤ | ⬤ | ⬤ | ⬤ | ⬤ |
| Using search engine to search through entire Arabic manuscript bibliographic data (metadata) | ⬤ | ⬤ | ⬤ | ⬤ | ⬤ |

Question 18 concerns the subject's preferred retrieval methods in a digital library. Throughout the digital library examples, there are several ways in which the resources are categorised and presented. Therefore, the respondents were asked to rank their preferences for these different retrieval methods.

**19)** What kinds of technical services would you consider most important for a digital library of Arabic manuscripts?

| | Very Important | Important | No Preference | Less Important | Not Important |
|---|---|---|---|---|---|
| Ability to download/save images of Arabic manuscripts | ◯ | ◯ | ◯ | ◯ | ◯ |
| Ability to zoom in/out of images in Arabic manuscripts | ◯ | ◯ | ◯ | ◯ | ◯ |
| Ability to share images of Arabic manuscripts via social networking (e.g., CiteULike, Facebook, Delicious, etc.) | ◯ | ◯ | ◯ | ◯ | ◯ |
| Ability to print out images of Arabic manuscripts | ◯ | ◯ | ◯ | ◯ | ◯ |
| Ability to compare more than one image side-by-side in the browser | ◯ | ◯ | ◯ | ◯ | ◯ |
| Ability to browse and search the assistance tools (e.g. dictionaries, biographies, directories, bibliographies, references works, etc.) in the digital library. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Ability to insert comments on Arabic manuscripts images (personal annotations) | ◯ | ◯ | ◯ | ◯ | ◯ |

Question 20 is about the affordance services that may be provided by a digital library of Arabic manuscripts. (Kimani et al., 2005) present some of the listed services and personalisation in Q20, such as downloading, saving, and printing. Sharing was added as a result of the widespread adoption of Web 2.0 applications. Comparing was added as a result of the fact that user's tasks include identifying variations between different copies of one manuscript. This has recently been adopted by Wellcome Arabic manuscripts online (see Figure 1-3). The ability to insert comments or annotations was

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added. (This is now available in the Manuscript (Makhtota) Digital Library of Prince Salman Library (PSL), based on the researcher's recommendation). The questions therefore covered all the desired data to be obtained.

**20)** Beside Arabic manuscripts, what would you consider necessary in the digital library?

| | Very Important | Important | No Preference | Less Important | Not Important |
|---|---|---|---|---|---|
| Arabic manuscripts text-books, and references | ○ | ○ | ○ | ○ | ○ |
| Directories of theses and dissertations | ○ | ○ | ○ | ○ | ○ |
| Dictionaries and glossaries | ○ | ○ | ○ | ○ | ○ |
| Bibliographies of Arabic manuscripts | ○ | ○ | ○ | ○ | ○ |
| Journals of Arabic manuscript | ○ | ○ | ○ | ○ | ○ |
| Atlases | ○ | ○ | ○ | ○ | ○ |
| Biographies | ○ | ○ | ○ | ○ | ○ |
| Catalogues of Arabic manuscripts | ○ | ○ | ○ | ○ | ○ |

Question 20 relates to identifying the most reliable and preferred resources that can be integrated into a digital library of Arabic manuscripts. (Auchterlonie and Abu-Zayed, 2008) emphasise the necessity of the existence of other resources, such as some of the resources listed in Q 21. A number of editing manuals (e.g., (Harun, 1965) (Munajjid, 1987; Sa`D and Majdhub, 1993) (Ghiryani, 2006)) have stressed that manuscriptologists must use these resources for editing Arabic manuscripts and consider these resources as editing tools.

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**21)** Are there any other materials that you would like to add? (If so, please list them below and specify why they are important to you):

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**22)** If there are any comments, notes, or recommendations you would like to add, please list them below:

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  Questions 21 and 22 give participants the opportunity to add any resource, service, and recommendation relating the to questionnaire survey.

  The questionnaire contains open-ended and closed-ended questions. Some questions are single answer choice, such as Q2 and Q10. In addition, there are multiple answer options (e.g. Q6, Q12). A five-point Likert-type scale was applied in some questions (e.g. Q18, Q20). There are also questions in matrix answer format (e.g. Q 17, Q20). There are two conditional question and logical skip (i.e. if choose one answer move to another question): Q10: if (NO) move to Q22, and Q12: if (NO) move to Q15.

### 4.3.3.2 Piloting the Questionnaire

  Before distributing the questionnaire, a pilot study was conducted. Pilot study in the research literature has two meanings; 1. A small-scale implementation of a large study (also called "feasibility study"), 2. Pre-testing of a particular study instrument, such

as a questionnaire (Given, 2008). In the context of this study, the pilot study was utilised to test its instruments: the paper- and web-based questionnaires.

The questionnaire was sent to seven academic referees (3 university staff members, 2 librarians, and 2 post-graduate students) selected through the researcher's personal contacts in May 2009. Each participant was asked to provide comments on completing the questionnaire and comments about the design of the questionnaire. Five questionnaires were returned with comments. The comments related to aspects of the questionnaire as follows:

- Amendments regarding reforming some questions.
- Suggestion regarding the Likert-type scale (five points); changing the order to be, for instance, 1= most important, to 5=least important. This was based on the popularity of using this order in Arabic research. According to Kothari (2005), either order is permissible provided it is clearly defined in the question.

Comments and suggestions by referrals were taken into account, and a final version of the questionnaire was produced at the end of July 2009. The web-based questionnaire in Beta version was examined by four referees. Positive comments were received by the referrals.

### 4.3.3.3 Questionnaire Sampling

A non-probability sample (i.e. volunteer sampling) was employed. Volunteer sampling refers to:

> *" the process of selecting a sample by asking for volunteers. This may involve putting an ad[vertisement]  in the newspaper or going to local organizations such as churches, schools, or community groups."* (O'leary, 2004), p110).

The study population consists of university staff members, independent researchers, and postgraduate students who are engaged in editing or studying Arabic manuscripts as end-users in the KSA. In addition, providers of Arabic manuscripts as are involved in this study. Ten providers of Arabic manuscripts have been chosen in this study (on page 128). There are 39 librarians working at Arabic manuscript departments/units at provider institutions (e.g. KFNL, PSL, etc…).  All 39 librarians were asked to participate in the questionnaire survey. Thirty-one librarians participated.

As mentioned previously, the population size of end-users was not known (on page 133). Therefore, at each of the ten studied libraries in Arabic manuscripts departments/units there was a poster asking the departments users to participate in the questionnaire survey. This poster included an invitation to fill in paper-based or web-based questionnaires.  Moreover, other technique has been utilised to invite participants (see below). Twenty paper-based questionnaires were distributed at each of the ten Arabic manuscripts departments/units. The librarians of these departments/units were asked by the researcher to encourage users to volunteer to fill in the questionnaire. The

researcher considered 20 in each library to be sufficient, as this would give a potential sample size of 200, in addition to the respondents who would choose to answer online.

In the cover letter of each paper-based questionnaire, a web-based URL (http://www.smart-survey.co.uk/v.asp?i=16922hfwvg) was provided to give respondents the option to fill in either the paper- or web-based questionnaire. These comprised 82 returned paper-based questionnaires, equalling 41% of the total of distributed paper-based questionnaires. However, fourteen paper-based questionnaires were excluded due to the respondents not having answered all the questions, leaving 68 for analysis. For the online questionnaire, 63 participants were directly invited by e-mail, and threads were posted on two specialised e-forums on Arabic manuscripts inviting participation in the questionnaire survey. Those who were directly invited were identified through the researcher's personal contacts. Six online questionnaires were excluded as not all of the questions had been completed leaving 107 valid online questionnaires for analysis. Valid analysis of questionnaire data was dependent on completed responses to all questions. A total of 175 valid questionnaires were returned.

It can be seen that the proportion of valid web-based questionnaires returned exceeded that of the paper-based questionnaires. This could be partially attributed to Cook et al.'s (2000) finding that personalised contacts, and contacting sampled individuals before prior to sending out the survey two of the main factors in a high response rate.

**4.3.3.4 Questionnaire Data Analysis**

The gathered data were represented as quantitative data. Statistical Package for Social Solution (SPSS) (version 19) for Windows was used to analyse the gathered data. A simple statistical description was presented by using frequency tables. In addition, some statistical tests were applied, such as a measure of statistical dispersion, such as

$$weighted\ mean = \bar{X}_w = \frac{w_1X_1 + w_2X_2 + \ldots + w_nX_n}{w_1 + w_2 + \ldots + w_n}).$$

The Mann-Whitney U test was applied to determine the significant difference between the requirements of end-users and librarians. The Mann-Whitney U test is "a non-parametric test used to determine whether scores from two unrelated samples differ significantly from one another. It tests whether the number of times scores from one sample are ranked higher than scores from the other sample when the scores for both samples have been ranked in a single sample" (Cramer and Howitt, 2004). Chi-squared has been utilised to figure out statistical significances of participants' characteristics associated with their internet usage.

## 4.4 Evaluation of Digital Libraries of Arabic Manuscripts

This study aims to provide recommendation for best practice in digital libraries of Arabic manuscripts. Features and characteristics of a number of selected digital libraries of Arabic manuscripts were presented in (Chapter Three; 3.4). In order to achieve the research aim, these studied digital libraries are examined in the light of users' requirements. The evaluation of the mentioned digital libraries is intended to answer the question: Do the studied digital libraries of Arabic manuscripts meet users' requirements?

According to Fuhr et al (2007), evaluation is of great significance, not only to ensure the appropriate development of digital libraries, but also their acceptance by users. In this regard, Xie (2006) contends that users of digital libraries should "have their voices heard" in the evaluation of digital libraries, as the primary aim of digital libraries is to serve users and meet their requirements. Hence, before any evaluation could take place, the users' requirements were identified through questionnaires and interviews. Saracevic and Kantor (1997) and Kyrillidou (1998) both emphasised the importance of evaluating traditional libraries based on user feedback as did Monopoli (2002) and Lesk (2005) in the context of digital libraries. The evaluation process is shown in Figure 4-2 below.
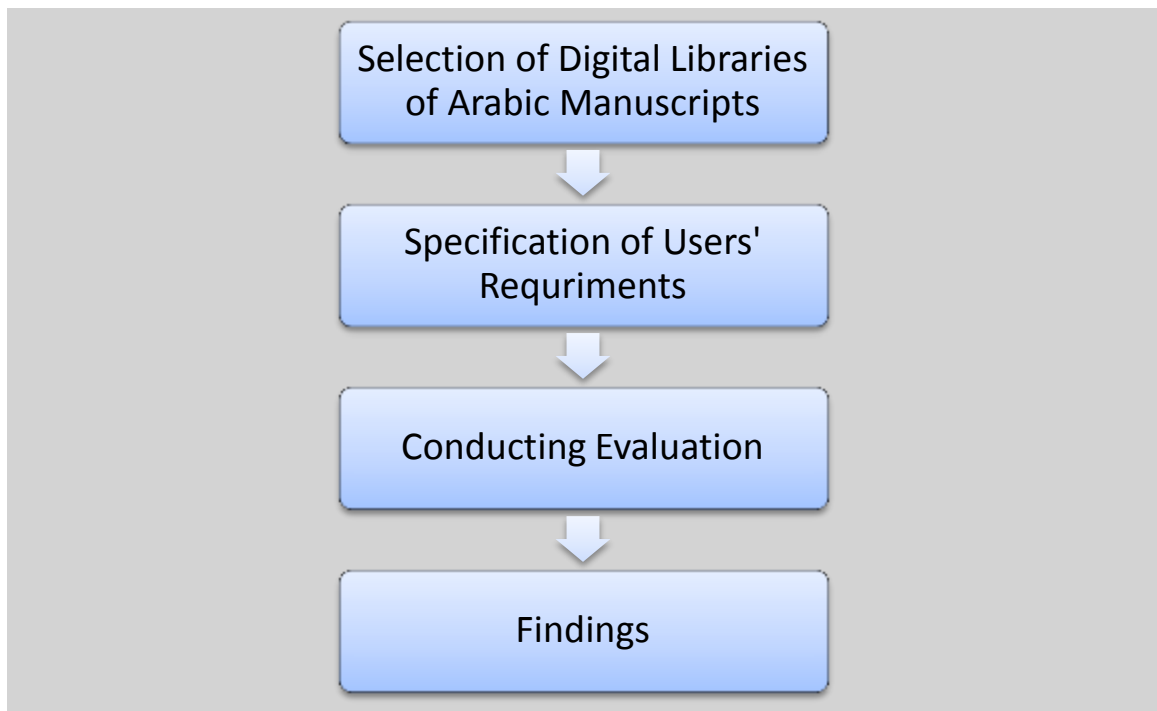


**Figure 4-2: Evaluation of Digital Libraries of Arabic Manuscripts**

The above figure illustrates the evaluation process of the studied digital libraries of Arabic manuscripts. In Chapter Three (3.4) the selection of digital libraries was presented. Chapters Five and Six addressed the studied users' requirements as identified from the data analysis. At the stage of conducting the evaluation, a practical method was used. That is, the researcher accessed the websites of the selected digital libraries and systematically checked whether they provided each of the requirements expressed by users regarding functions, retrieval methods, and services. The results of the evaluation are presented in Chapter Seven and summarised in Table 7-2.

## 4.5 Ethical Considerations

As agreed by a number of authors of research methodology literature, ethical issues should be taken into consideration during the research processes (Gray, 2004) (Gorman and Clayton, 2005) (Kothari, 2005) (Creswell, 2009). As this research interacts with participants to elicit and gather information about the research scope, several steps were taken. During the interview sessions, each interviewee agreed to be interviewed and recorded. The interviewer informed the interviewees that their responses would be strictly confidential, and used only for the purposes of academic research.

The researcher was issued by his home university with a request letter to conduct data collection. In some cases, the researcher was asked to obtain a letter of approval from the institution to which the library belongs. A privacy and confidentiality statement was provided in the cover letter of each questionnaire.

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## 4.6 Summary

The research strategy of this study was divided into two sequential phases, and each phase employed research methods. The first phase used desk research, and the second phase utilised triangulation mixed method (i.e. qualitative and quantitative). The sampling type of both qualitative and quantitative methods was non-probability. The interviewees consisted of 10 providers of Arabic manuscripts and 14 end-users, and 175 participants took part in the questionnaire survey. Data representation, analysis, and findings are presented in following chapters.

# CHAPTER FIVE INTERVIEW ANALYSIS AND DISCUSSIONS

## 5.1 Introduction

This chapter presents the overall results of the face-to-face interviews with providers of Arabic manuscripts and users of Arabic manuscripts in the Kingdom of Saudi Arabia. In this chapter, an in-depth analysis of interviews with Arabic manuscript providers in the KSA is presented first. This is followed by the analysis of the convenience sample of end-users.

## 5.2 Arabic Manuscript Providers in the KSA: Interview Analysis and Discussion

Arabic manuscript providers are those who hold and provide access to Arabic manuscripts. This may refer to institutions (e.g. libraries, universities, government bodies, and so forth) or individuals (e.g. Arabic manuscript brokers and Arabic manuscript collectors).

The selected Arabic manuscript providers in this study were based on information in the Saudi Libraries and Information Centres Directory (SLICD), issued by KFNL 2007 (Kfnl, 1999) as stated in Chapter Four (see, Interviews with providers of Arabic manuscripts4.3.1.1. Individual providers such as brokers, collectors, and/or end-users,

who usually acquire their Arabic manuscript collection over time, were excluded from this study due to the lack of a comprehensive resource available that would have provided the details necessary for the researcher to contact them.

## 5.2.1 Providers of Arabic manuscripts involved in the study

- King Fahad National Library (KFNL).

- King Abdullah Bin Abdullaziz University Library (KAAUL).

- Central Library of King Saud University (Prince Salman Library) (PSL).

- Central Library of Al-Imam Muhammad Ibn Saud Islamic University (CL-AIMISIU).

- The Central Library of Islamic University in Madinah (CL-IU).

- Central Library of King Abdulaziz University (CL-KAU).

- King Faisal Centre for Research and Islamic Studies (KFCRIS).

- The Noble Prophet's Mosque Library (NPML).

- King Abdulaziz Public Library (KAPL).

- The Library of Saud Albabtain Centre for Cultural Heritage (LSAC).

**Table 5-1: Studied Arabic Manuscripts Providers in the KSA**

| Provider | Type[23] | City | URL |
|---|---|---|---|
| KFNL | National | Riyadh | http://www.kfnl.gov.sa/ |
| KAAUL | Academic | Makkah Al Mukarramah | http://uqu.edu.sa/lib/en |
| PSL | Academic | Riyadh | http://ksu.edu.sa/Deanships/library/Pages/Home.aspx |
| CL-AIMISIU | Academic | Riyadh | http://library.imamu.edu.sa/index.html |
| CL-IU | Academic | Al Madinah Al Munawwarah | http://iu.edu.sa/web/content.aspx?id=303 |
| CL-KAU | Academic | Jeddah | http://library.kau.edu.sa/Default.aspx?site_id=212&lng=EN |
| KFCRIS | Special | Riyadh | http://www.kfcris.com/index_en.php?page=e-home |
| NPML | Special | Al Madinah Al Munawwarah | http://www.mktaba.org/ |
| KAPL | Public | Riyadh | http://www.kapl.org.sa/eindex.php |
| LSAC[24] | Special | Riyadh | http://www.albabtaincenter.com/index.php |

Five academic libraries were involved in the study as academic providers. The remainder of the providers selected consisted of three special libraries, one public library, and one national library, as shown in Table 5-1.

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[23] These have been categorised according to Saudi Libraries and Information Centres Directory (SLICD).

[24] . A charitable organisation interested in Arabic manuscripts.

**5.2.1.1 Background Knowledge about the Arabic Manuscript Collections with the Providers of Arabic Manuscripts Studied**

**Table 5-2: No. of AMSs according to SLICD**

| *Provider* | *No. of AMSs according to SLICD* |
| --- | --- |
| KFNL | 4200 |
| KAAUL | 5000 |
| PSL | 21129 |
| CL-AIMISIU | 21998 |
| CL-IU | 23638 |
| CL-KAU | 5000 |
| KFCRIS | 51501 |
| NPML | 5400 |
| KAPL | 8600 |
| LSAC | 13000 |
| Total | 204466 |

Through surveying and interviewing the Arabic manuscript provider sample, each was found to have a specific department or unit for manuscripts. Several of the studied providers have a department called the "Manuscripts Department", while others have called their departments or units "Special Collection Department", which also contain other resources, such as coins, models, antiques, artefacts, etc. The number of Arabic manuscripts at the studied providers according to SLICD is shown in Table 5-2 (King Fahad National Library, 2007).

**Table 5-3: Reported No. of AMSs by Studied Providers**

| Providers | Original AMSs | Photocopied AMSs on Paper | Microfilmed AMSs | Scanned AMSs | Total |
|---|---|---|---|---|---|
| KFNL | 4200 | Unrecorded | 11600 | 2900 | 18700 |
| KAAUL | 3500 | Unrecorded | Unrecorded | 15000 | 18500 |
| PSL | 13200 | 1940 | 9000 | 8300 | 32440 |
| CL-AIMISIU | 10100 | 600 | 12300 | Unrecorded | 23000 |
| CL-IU | 22000 | 5100 | 15000 | 6000 | 48100 |
| CL-KAU | 3200 | Unrecorded | 2200 | Unrecorded | 5400 |
| KFCRIS | 25907 | Unrecorded | 60000 | 5000 | 90907 |
| NPML | 5400 | 2500 | 750 | 15000 | 23650 |
| KAPL | 4400 | 700 | Unrecorded | Unrecorded | 5100 |
| LSAC | 8000 | Unrecorded | Unrecorded | 15000 | 23000 |
| Total | 88700 | 10840 | 58850 | 67200 | 288797 |

Table 5-3 shows the number of Arabic manuscripts held by the studied providers according to the 2009 year report, records, or statements during the interview, and reviewing the available reports by studied providers. The number of Arabic manuscripts at some of the studied providers has increased. This table includes a variety of forms of Arabic manuscripts. However, it can be seen that some data are unrecorded due to approximations or a lack of specific numbers reported by the studied providers.

> *".. it becomes easier to acquire Arabic manuscripts, especially in scanned forms, as a result of the digitisation of Arabic manuscripts collections in many libraries around the world to provide [surrogates] to users. Some people collect these [surrogates] and sell or donate them… from time to time we've received [such offers]"* KFCRIS.

*"..[R]ecently, we have purchased thousands of digitised Arabic manuscripts from Arabic manuscript brokers on CD-ROM. We are in process of including them in our collection"* CL-AIMISIU.

Moreover, some of the studied providers admit that many of the Arabic manuscripts in different forms have not been catalogued yet.

*"The number of [Arabic] manuscripts has not been included in the library record files, and indeed has not yet been catalogued for certain reasons. Lack of professionals, standards, and working tools are the most obvious problems facing librarians"* CL-IU.

*"..[L]ack of professional cataloguers of Arabic manuscripts leads to a shortage of bibliographic tools, e.g. comprehensive catalogues, handlists, and/or bibliographies, which make many of the Arabic manuscripts in libraries inaccessible to users"* KFCRIS.

This problem has been documented by numerous studies such as those by (Mashukhi, 1989; Binebine, 1998) (Hafyan, 1998) and it has been discussed earlier in this research (on page 52).

## 5.2.2 Functions of Arabic Manuscript Providers

The studied providers of Arabic manuscripts were asked to state their roles and functions with regard to Arabic manuscripts as materials, and end-users as consumers.

### 5.2.2.1 Acquisition and Preservation of Arabic Manuscripts

All the studied Arabic manuscript providers stated that acquiring and preserving Arabic manuscripts in different forms (i.e. original, and surrogates; copied on paper, microforms, and/or digital) is a crucial role for them to provide access to users.

> *"Acquiring Arabic manuscripts in any form and from any place (East to West) is our duty as a scholastic service as providers of Arabic manuscripts to researchers" PSL.*
> *"...our main roles as an Arabic manuscript provider for scholars and post-graduate students are the safe storage of Arabic manuscripts and facilitation of access to these manuscripts" KAAUL.*

The development of the Arabic manuscript collections of interviewed providers can occur through purchase, exchange, donations, and bequest. Many scholars or heirs have donated their Arabic manuscript collections to libraries.

> *"We have mutual agreements with popular Arabic manuscript repositories around the world, such as the Bibliothèque Nationale of Paris, the Library of Congress, the British Library, El Escorial Library, etc., to obtain copies [surrogates] of Arabic manuscripts" KFCRIS.*

*"[W]e have received manuscripts as donations or bequests from many scholars or heirs. Donations and endowments have played a significant role in developing our manuscript collection, and other libraries' collections… we name the donated collections after their donors, such as the collection of Shikh Ibn Manea"* KFNL.

Nowadays, most acquired Arabic manuscripts are copied, especially in digital forms as images of original manuscripts.

*"Thousands of Arabic manuscripts are digitised by their owners, so most available manuscripts for purchasing and exchanging are in digital form"* NPML.

The purchase of original Arabic manuscripts can be done through auctions, well-known brokers, and/or personal communication with the seller. However, the purchase of a manuscript involves long procedures; a critical part of these procedures is the evaluation of the manuscript, especially with respect to falsification.

*"Falsification is a big issue when you decide to acquire a manuscript; therefore we offer a free consultation to any institution or persons who are willing to buy a manuscript"* KFNL.

## 5.2.2.2 Conservation, Restoration, and Maintenance of Arabic manuscripts

As historical materials, some Arabic manuscripts in their original form may be in a worn condition (example in Figure 5-1) as a result of an inadequate preservation environment (Halwaji, 1989); (Déroche et al., 2006); (Al-Khatib et al., 2007). Therefore,

the manuscripts need to be conserved through sterilisation, chemical treatments, and rebinding (Yusuf, 1984).



**Figure 5-1: Damaged Arabic Manuscript (Image)**

KFNL, KAAUL, PSL, and KFCRIS report that they have manuscript conservation laboratories. Some of the studied providers of Arabic manuscripts state that they take advantage of manuscript conservation laboratories provided by other institutions, such as KFNL (Figure 5-2, Figure 5-3), and/or King Abdulaziz Foundation for Research and Archives. Moreover, some of the researched providers of Arabic manuscripts report that they outsource to laboratories.

**Figure 5-2: Manuscript Conservation Laboratories in KFNL (Image)**
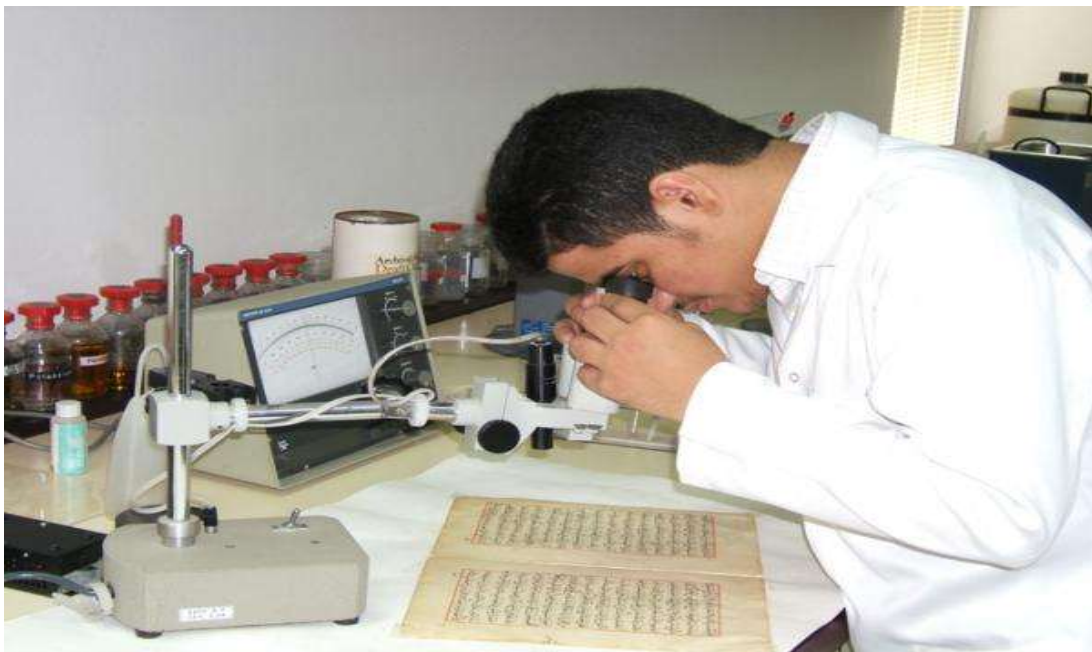


**Figure 5-3: Manuscript Examination for Restoration (Image)**

### 5.2.2.3 Managing and Organising Arabic Manuscript Collections

The majority of providers in the study report that they conduct in-house cataloguing of their Arabic manuscripts. Moreover, many state that they have published Arabic manuscript catalogues in book form as classic producers (e.g. Manuscript Catalogue of Umm Al-Qura University).

> *"..[Arabic] manuscripts are catalogued and classified by our cataloguers, and we use cataloguing applications that include all bibliographic data (e.g. Author, Title, Date, and so on so forth). The MARC format has been modified to be suitable for Arabic manuscript bibliographic data fields in our automation system [Horizon]" CL-AIMISIU.*

As previously stated in (on page 52), there is a common agreement in the available literature that there is a lack of comprehensive bibliographic control tools for Arabic manuscripts at a global level, as well as at the level of Arab countries (Sezgin, 1991b; Roper, 1992). With respect to the Kingdom of Saudi Arabia (i.e. the study field), the situation of controlling Arabic manuscripts and defining where they are preserved, such as catalogues, handlists, bibliographies, etc, has also been suffering from a shortage of bibliographic control tools (Sa`Ati, 1993). However, there are ongoing projects and efforts to control Arabic manuscripts which are within the borders of Saudi Arabia, such as the Manuscript Heritage Protection Act (on page 75), and KFCIRS databases (see page77).

As a result, some of the interviewed providers stated that they have taken advantage of outsourcing companies or hiring cataloguers to compensate for the scarcity of professional cataloguers.

> *"Arabic manuscript cataloguers are a (rare coin) minority; therefore, we sometimes hire cataloguers part-time to help in cataloguing our Arabic manuscript collection"* LSAC.

> *"..[T]he library holds a huge number of Arabic manuscripts in different forms, and we only have one professional cataloguer. So, we recruit some postgraduate students who are studying Arabic manuscripts in the university departments (e.g. Linguistics Department) to participate in cataloguing our Arabic manuscript collection as a course assignment, and in some cases we pay them"* CL-IU.

### 5.2.2.4 Accessing Arabic manuscripts

All the interviewed providers agree that the browsing of original Arabic manuscripts by users is carried out under strict rules and procedures. For instance, users are closely monitored and must make a serious effort to protect the manuscripts by wearing gloves, no direct contact with the manuscript, using book support, etc. (Liew, 2006). These types of rules and regulations for manuscript usage are well-known in many libraries, museums, and archival centres (e.g. Suleymaniye Library in Istanbul Turkey, and the British Library[25]).

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[25] . To read more about collection policies and roles at British Library, available at:
http://www.bl.uk/aboutus/stratpolprog/ccare/collectioncarevideos/index.html . Last accessed 15-03-2011.

It is very common that end-users are provided with manuscript surrogates, such as photocopies on paper, microform, and/or digital copies.

*"... in the past, when a user wanted an [Arabic] manuscript he/she had to fill in a copy request form, then our librarian copied the manuscript onto paper. Nowadays, we have digital copies of Arabic manuscripts, so we give our users a digital copy of the manuscript on a CD-ROM or via e-mail"* LSAC.

*"It is rarely the case that users browse original manuscripts as rule at the library, because manuscript is a fragile material. However, there are exceptional circumstances for browsing the original manuscripts, for instance if a researcher needs to study some of the manuscript features that are not stated in the catalogue paper type, ink, colour, and some codicology data."* CL-KAU

*"...when a user seeks a manuscript that is not available in our collection, we directly send a [surrogate] copy request to the manuscript repository, even if this is abroad, for instance El Escorial Library.  However, receiving a copy may take a long time"* PSL.

## 5.2.2.5 Integration of Knowledge at Studied Providers of Arabic Manuscripts

At the majority of the studied Arabic manuscript providers of Arabic manuscripts, there are typically other information resources beside the principal one (i.e. Arabic manuscripts) in the Arabic manuscript departments/units. Secondary and tertiary sources

are provided by providers, whether in the manuscript unit (Arabic manuscript reading room) or integrated at the providers of Arabic manuscripts' collections.

> *"..[O]ur users frequently utilise editing resources, such as bibliographies, library catalogues, dictionaries, etc… so these tools are available in the Arabic manuscript reading room".* CL-IU.

> *"…[O]ther library catalogues, bibliographies, thesis and dissertation directories, as well as possibly some textbooks, should be made available to researchers. No scholarly work can be conducted without these materials; therefore, our role is to provide the [information] source to its user…"* PSL.

> *"… [B]ooks such as; Kashf al-zunun `an asami al-kutub wa-al-funun, Mu`jam al-muallifin: tarajim musannifi al-kutub al-`Arabiyah, Lisan Al Arab, etc, are indeed important to researchers. Therefore, we put them in the manuscript reading room, and there are also copies integrated in our library's collection"* CL-AIMISIU.

Studied providers were asked about the possibility of integrating other resources (e.g. dictionaries, bibliographies, directories, text-books, etc.) into a digital library of Arabic manuscripts. The majority of interviewed providers welcomed the integration of other resources.

> *".. [I]t would be a useful service for users, and [could] save time and money"* KAPL.

*"A traditional library, in fact, provides these resources to the users, and
providing a similar service via a digital library would a great opportunity"*
KFCIRS.


However, several issues and barriers have been raised by the studied providers of
Arabic manuscripts. An obvious issue is the copyright to such resources, as the studied
providers of Arabic manuscripts do not own the copyright to these resources (e.g.
dictionaries, text-books, etc). However, a number of these resources are in the public
domain. The other issue is the compatibility of the recent technologies with the
embedding of these resources, particularly with Arabic language retrieval, which are still
not completely resolved. A funding barrier was mentioned by KFCIRS, and LSAC.

### 5.2.2.6 Library Automation Systems at Studied Providers of Arabic manuscripts

The majority of the studied providers indicate that they are using integrated library systems to manage their collections. The following table shows systems that have been implemented by the interviewed providers.

**Table 5-4: Library Automation Systems**

| Provider | System | Parent Company | Local Vendor |
|----------|--------|----------------|--------------|
| KFNL | Horizon[26] | SirsiDynix | AAS[27] |
| KAAUL | Horizon | SirsiDynix | AAS |
| PSL | Unicorn | SirsiDynix | Knowledge WARE |
| CL-AIMISIU | Horizon | SirsiDynix | AAS |
| CL-IU[28] | Horizon | SirsiDynix | AAS |
| CL-KAU | Horizon | SirsiDynix | AAS |
| KFCRIS | MINISIS | MINISIS Inc. | N/A |
| NPML | In-house System | In-house | In-house |
| KAPL | Horizon | SirsiDynix | AAS |
| LSAC | In-house System | In-house | In-house |

The majority of providers of Arabic manuscripts who use automation systems to manage their collection report that most of their catalogued Arabic manuscripts have been integrated via their Online Public Access Catalogues (OPACs) (see Table 5-5).

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[26] . Horizon and Unicorn systems can be upgraded to SirsiDynix Symphony, which is now implemented in many libraries, museums, and archive centres in Arab world.

[27] . Arabian Advanced Systems "AAS" is a local vendor in Middle East, located in Riyadh, KSA. http://www.aas.com.sa/detail.asp?InServiceID=1&intemplatekey=MainPage

[28] . Recently, CL-IU has obtained a licence to use Horizon from AAS.

### 5.2.3 Digitisation Projects of Studied Providers

All the interviewed providers have taken advantage of the National Preservation of Original Manuscripts Project carried out by KFNL. Some studied providers state that they have initiated digitisation projects for their manuscripts.

> " ...[w]e have converted some of our unique manuscripts into digital form. Selected Arabic manuscripts were imaged by using a high resolution [....] camera, and stored on an external hard drive. This work has been conducted by [contractors]" CL-AIMISIU.

A number of the interviewed providers report that some of the Arabic manuscript images which have been produced by hired contractors under the National Preservation of Original Manuscripts Project, were inadequate and had some issues (e.g. unclear, disorganised, etc).

> "... [the contractor] who was authorised by KFNL to digitise some of our manuscript collection, there were some unclear images of manuscripts, because there was no accurate review at the digitisation process stage. We have decided to re-digitise a selection of Arabic manuscripts in different forms (e.g. original, paper, microform) according to certain criteria, such as high demand, condition, and recommendations by scholars or researchers" PSL.

It has been admitted by KFNL - the entity responsible for the National Preservation of Original Manuscripts Project - that there was insufficient awareness of digital preservation practices by the authorised contractors. For example, it can be seen

in Figure 5-4 and Figure 5-5) that double-page spreads were digitally photographed by contractors, causing problems due to the curvature of the pages.



**Figure 5-4: Arabic Manuscript Image. Flashing appeared (Image)**
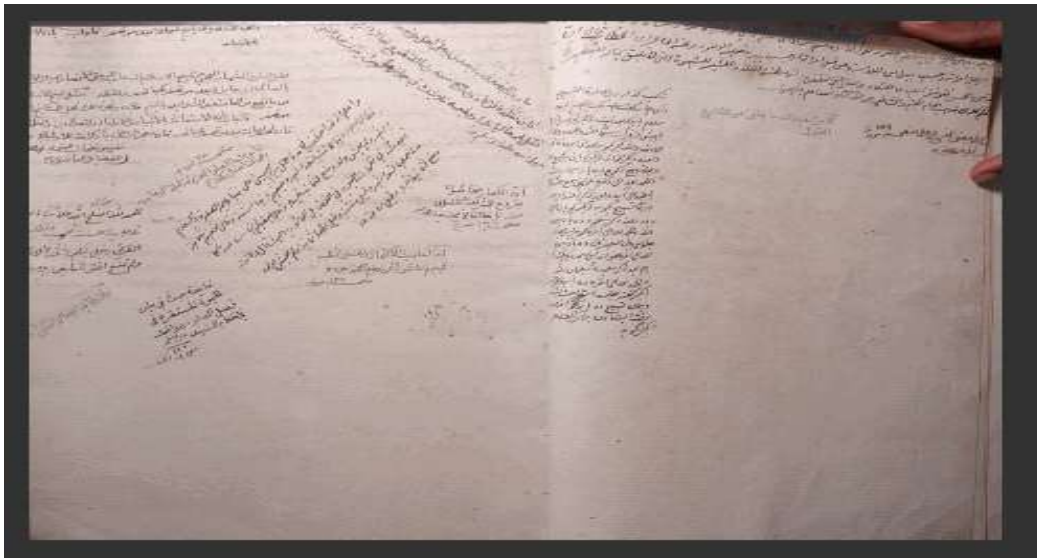


**Figure 5-5: Arabic Manuscript Image. Incomplete picture and unclear image**

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## 5.2.4 Digital Libraries of Arabic Manuscripts in the KSA

**Table 5-5: Studies Providers of Arabic Manuscripts' Digital Library and OPAC**

| Provider | Name of Digital Library | URL | AMS Bibliographic Data in OPACs |
|---|---|---|---|
| KFNL | None | None | Yes |
| KAAUL | Digital Library: Manuscripts | http://uqu.edu.sa/lib/digital_library/scripts_all | Yes |
| PSL | Makhtota; Manuscript | http://makhtota.ksu.edu.sa/MakhtotaEnglish.aspx | Yes |
| CL-AIMISIU | None | None | Yes |
| CL-IU | None | None | No |
| CL-KAU | None | None | Yes |
| KFCRIS | None | None | Yes |
| NPML | None | None | No |
| KAPL | None | None[29] | Yes |
| LSAC | None | None | No |

KAAUL (Figure 3-7) and PSL (Figure 3-6) have made some of their Arabic manuscripts available online as demonstrated (on page 95). Digitised Arabic manuscripts are fully accessible via PSL digital library. On the other hand, KAAUL provides partial access to the digitised manuscripts by limiting the display to a preview of certain pages of the manuscript. The majority of studied providers of Arabic manuscripts have integrated their Arabic manuscripts' bibliographic data in their OPACs, as shown in Table 5-5. However, some of the interviewed Arabic manuscript providers of Arabic manuscripts have not yet made their Arabic manuscripts' bibliographic data available online, for instance, via OPACs or static WebPages.

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[29] . KAPL launched a digital library of some of its collections in the first half of 2010. However, KAPL has now ceased its digital library service. The digital library was available at http://ipac.kapl.org.sa/eDoc/

## 5.2.5 Providers of Arabic Manuscripts' Perspectives about Online Access to Arabic Manuscripts

Interviewed providers  were asked to give their perspectives on making their Arabic manuscript collection available to be retrieved, browsed, read, and edited online, for instance via a digital library.

PSL, KAAUL, KAPL, and NPML have agreed to make some of their Arabic manuscripts collection available via a digital library. However, they stress the access and use policy of the manuscripts and the digital library.

> *"Some of our collection is available online, and we believe this initiative can be very helpful to the users. However, we think that many users are misusing this digital library, for instance by downloading many manuscripts and using them for trade purposes, or republishing them on other websites or e-forums without citing the source. Users should be aware of, and adhere to, the use policy"* PSL.

> *"We have made our Arabic manuscript catalogue on CD-ROM. Recently, some Arabic manuscript images have been added to our e-forum… It would be amazing to have a system which manages Arabic manuscript images via the Internet"* NPML.

Three of the studied providers of Arabic manuscripts showed their unwillingness to make their Arabic manuscripts available via the internet, for several reasons. Some interviewed providers mentioned that making Arabic manuscripts available online could threaten the status of their library by reducing the number of its actual users. This perception was found among the older generation of librarians interviewed.

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A number of interviewed providers stated that they do not trust the recent technology in terms of security issues. The most common statement among the studied providers is that their collection may be hacked or misused by some users. One of the statements from CL-AIMISIU about hacking online manuscripts concerns Al Azhar University manuscripts and rare books. In 2005, Al Azhar university launched a website (Figure 5-6) of approximately 48,000 manuscripts and 128,000 rare books (this was available on: http://www.alazharonline.org/Manuscripts/index.jsp, which is now a dead link). This project was funded by Sheikh Mohammed bin Rashid Al Maktoum, the ruler of Dubai. This huge project was discontinued for several reasons, of which the most obvious was that the collection was hacked and copied onto CDs for sale.

> *".. [w]e wouldn't put our collection at risk of [hacking] by some users or brokers who don't respect our rights or intellectual property… the Al Azhar manuscript collection was hacked and offered for purchase by brokers"* CL-AIMISIU.

**Figure 5-6: Al Azhar University Manuscripts and Rare Books Website. Retrieved from Archive.org (Screenshot)**

One of the ways in which online manuscripts are misused is by epublication on e-forums without, for instance, mentioning their source (i.e. location and provenance). There are many digitised Arabic manuscripts that have been uploaded on, for instance, file-sharing websites (e.g. 4shared.com, Megashare.com, rapidshare.com), by using Archive.org (Figure 5-7) or e-forum servers by users.

**Figure 5-7: Uploaded Arabic Manuscript on Archive.org (Al sunan AlKubra) (Screenshot)**

Most of the uploaded Arabic manuscripts are without their bibliographic and codicological data; these data are very important for researchers and editors. For example, identifying a manuscript's location and provenance is necessary for scientific research; therefore, researchers and editors adhere to the principle of clearly stating the source (i.e. library, museum, archive centre, etc) of the manuscript being edited. Moreover, there are data that researchers and editors need for their research; it may be that these data do not exist in a manuscript itself. Bibliographic data contains valuable information that is necessary for researchers and editors.

> *"...[M]any [name] Library manuscripts are uploaded on e-forums by some users who think that this could help other researchers. In fact, this action harms the scientific research community. As we are holders of manuscripts, we are responsible for the quality of academic research"* CL-IU.

A number of academic providers interviewed stated that some of their manuscript collection is held under restrictions for accessing and using. These manuscripts may be reserved for research activities by the academic department or employed researchers. Moreover, some manuscripts may include content (e.g. magic and sorcery) that is restricted to specific users.

*"In this university, departments that provide higher education courses [Master of Art, and Doctoral of Philosophy] usually reserve certain manuscripts to be edited by their students; therefore, we are reserving access to these manuscripts for these students"* CL-IU.

*"… [W]e normally receive reservation requests for specific Arabic manuscripts from academic departments for their educational and research purposes, then we preserve them"* PSL.

## 5.2.6 Digital Library Requirements from the Providers ' Perspective

Interviewed providers were asked to report their requirements for establishing a digital library of Arabic manuscripts. These requirements were proposed as follows:

### 5.2.6.1 Content Management

The majority of interviewed providers reported the great importance of using a system that manages their content (i.e. Arabic manuscripts) via the web.

> *"Indeed, making Arabic manuscripts available online needs a system to manage, organise, and provide a suitable service for users… and we should pay attention to such systems"* KFCIRS.

> *"We already have a digital library of our collection available online. However, we are now in the process of updating this digital library by using a system as part of the whole project to automate our services online… we have already received Requests For Proposal from a number of contractors and we are now evaluating the best option"* PSL.

Most of the interviewed providers preferred commercial software to open source software as CMS. This may be as a result of the lack of open source software that by default supports the Arabic language, and lack of technology knowledge.

> *".. we had used open source software (DSpace) to manage some of our digitised collection [theses, articles]; however, we have transferred our collection to another commercial system, as a result of the departure of the software developer from our technical support department"* KAAUL.

Greenstone software is an example of open source software that is used to manage content via the web. Moreover, this software supports Arabic language content and supporting images. Greenstone has been used as a digital library of manuscripts by the University of Malaya (MyManuscript) URL: http://mymanuskrip.fsktm.um.edu.my/Greenstone/cgi-bin/library.exe

Some interviewed providers reported some technical requirements of the system that should be included:

- Supporting Arabic language interface,

- Supporting multilingual features,

- Supporting metadata standard (e.g. Dublin Core),

- Facilitating simple and advanced search features,

- Compatible with other library automation systems,

- Supporting image browsing, storing and retrieval,

- Supporting a variety of content formats,

- Providing security and back-up of the content,

- Providing administration facilities (e.g. authentication).

### 5.2.6.2 Content Administration

Several requirements were reported by the interviewed providers in their capacity as the holders of the content. The main requirement that was frequently reported is membership management. Providers want to be aware of who is using their service by, for instance, registering as a member of the digital library.

The majority of providers mentioned have a written policy and agreement of which users should be aware. This policy states the rights and duties of both sides; providers of Arabic manuscripts as providers, and end-users as consumers.

### 5.2.6.3 Services and Interface of Digital library

Provision of a browsing facility for locating an Arabic manuscript within the collection (e.g. by; author, title, subject, etc.) was stated by most interviewed providers. In addition, providers mentioned the ability to add a search engine of Arabic manuscripts' descriptive data.  A high importance was reported by interviewed providers of displaying Arabic manuscripts and using zoom in/out features. The application of Web 2.0 has been mentioned by KFCIRS as a feature that could enhance the digital library services. Creation of knowledge by embedded blog, wiki, e-forum, was reported by NPML;

> *"..[We] think that providing such an e-forum in the digital library can give advantages to users through sharing knowledge... We have realised that users of [our] current e-forum are benefiting. Every day we receive new members and more new posts on the e-forum".*

The PSL digital library has taken the step of inviting users to contribute in converting any of their Arabic manuscripts which are available online via the digital library, by rewriting the manual inscription text into electronic text via the digital library. This step was based on the present researcher's suggestion.

## 5.3 Arabic Manuscript End-users in the KSA: Interview Analysis and Discussion

End-users are those who use Arabic manuscripts for scholarly and scientific purposes in context of editing (e.g. textual criticism, codicology, or palaeography).

Fourteen semi-structured interviews were carried out with potential end-users, (academics, post-graduate students and independent researchers) of a digital library of Arabic manuscripts. These interviews were conducted to gather the data required for this research. The objective of these interviews was to collect data and information associated with end-user requirements, which is essential for the establishment the digital library for Arabic manuscripts in the KSA.

### 5.3.1 Interviewee Background

As shown in Table 5-6, all interviewees are interested in Arabic manuscripts (i.e. manuscriptologists), whether as students, researchers, or university staff members. They come from various humanities backgrounds.

**Table 5-6: Interviewee Background**

| ID | Position | Degree | Speciality | Approx. no. of years of experience |
|----|----------|--------|-----------|-----------------------------------|
| P1 | University staff member | PhD | Islamic Studies | 20 |
| P2 | University staff member | PhD | Islamic Studies | 12 |
| P3 | University staff member | PhD | History | 22 |
| P4 | University staff member | PhD | Arabic language and literature | 10 |
| P5 | University staff member | PhD | Arabic language and literature | 9 |
| P6 | Independent researcher | PhD | Arabic language and literature | 15 |
| P7 | Independent researcher | PhD | History | 10 |
| P8 | Independent researcher | MA | Islamic Studies | 5 |
| P9 | Post-graduate student | MA | Islamic Studies | 3 |
| P10 | Post-graduate student | MA | Islamic Studies | 5 |
| P11 | Post-graduate student | MA | History | 3 |
| P12 | Post-graduate student | MA | History | 2 |
| P13 | Post-graduate student | BA | Arabic Language and Literature | 3 |
| P14 | Post-graduate student | BA | Arabic Language and Literature | 1 |

All interviewees have experience of editing Arabic manuscripts, although this experience is variable. The average experience of university staff members is approximately 14 years. On the other hand, students who are doing PhDs and MAs have an average of approximately 3 years' experience of editing Arabic manuscripts.

## 5.3.2 The Use of Technology by Interviewees

The majority of interviewees reported that they were able to use information and communication technologies.

> *"Researchers are obliged to use a computer to meet their needs and conduct activities such as searching the web, using a word processor for writing, and even for preserving materials"* [P6].

This result is in contrast to some studies that showed that use of technology in the humanities field in Oman (Al-Aufi and Genoni, 2010), and by Arabic manuscript users in Morocco (M'kadem and Nieuwenhuysen, 2010), is still a barrier.

It should also be noted that manuscriptologists have long-term experience of using information technologies by utilising pre-digital era technologies such as microforms.

> *"... I'm encouraging my students to take advantage of the Internet as a tool for locating manuscripts... I've been using these technologies since 1984 and I owned a microfilm reader a long time ago"* [P3].

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However, Arabic manuscriptologists are careful when dealing with the internet in terms of the content. Authority, credibility, reliability, accuracy, etc. are of vital importance to Arabic manuscriptologists.

> *"[N]ot all information available on the internet is trustworthy and acceptable to be cited by researchers and students... verification and evaluation of information resources is their role…"* [P1].

## 5.3.3 End-users' Resources in the Real and Virtual worlds

Interviewees were asked to talk about the most commonly-used resources for the purpose of editing Arabic manuscripts.

### 5.3.3.1 Primary Text Source

All interviewees (i.e., scholars, researchers, students) considered the manuscript to be a primary source for their research activities; this also stated by (Halwaji, 1989), (Samarrai, 2001), and (Déroche et al., 2006). Browsing and reading the whole bulk of a manuscript in original format or surrogates (i.e. photocopy, microform or digital format) is the manuscriptologist's task (Mergoupi-Savaidou et al., 2008).

### 5.3.3.2 Arabic manuscript catalogues and bibliographies

Arabic manuscripts catalogues and bibliographies play a significant role in guiding researchers to manuscripts. Although catalogues and bibliographies have different functions and purposes, they are both bibliographic tools and provide a wealth of information to users about manuscripts. Arabic manuscript catalogues and

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bibliographies are basic and necessary resources that researchers, scholars and students must use before and during research activities (Harun, 1965) (Munajjid, 1987) (Sayyid, 1997; Ghiryani, 2006)). This was stressed by most interviewees.

*"...[A]ccessing and locating Arabic manuscripts is done through library catalogues. It is an essential tool that researchers have to use"* [P2].

*"When I started my PhD research, I searched all published Saudi library catalogues to locate [his selected Arabic manuscript]. When I figured out where it was kept, I made a copy request. Then I started searching to see if there were any copies of the selected manuscript available anywhere else, and I found one in Leiden University and I was so lucky that a microfilmed copy was kept at PSL, otherwise it would have taken months to obtain that copy"* [P10].

*"...[W]e teach students to use bibliographies, such as Kashf al-zunun `an asami al-kutub wa-al-funun, Tarikh al-adab al-`Arabi and so, when they [are] looking for manuscripts and during their research process. These resources provide valuable information that might not be found in a manuscript itself"* [P4].

### 5.3.3.3 Monographs and Textbooks

Monographs and textbooks that are related to editing manuscripts and research are heavily used by researchers, scholars and students. A number of studies have demonstrated that students of the humanities are more reliant on monographs than journals (Stone, 1982) (Latour and Woolgar, 1986) (Knorr-Cetina, 1999),  as cited in

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(Benardou et al., 2010). There are a number of textbooks published to guide manuscriptologists in the editing of Arabic manuscripts, and most schools that provide courses in editing Arabic manuscripts have recommended them as main references.

> *"..[O]ur students who are studying editing manuscripts relied on scientific principles that are found in textbooks, such as Tahqiq al-nusus wa-nashruha by Harun [Editing Text and Publishing] Qawa`id tahqiq al-makhtutat by Munajjid [Editing Manuscript Rules] etc…. these books are used continuously during the editing processes"* [P1].

> *"…[T]here are several textbooks and editing manuals relating to Arabic manuscripts that students should read. These resources are very important for editing Arabic manuscripts and guiding researchers to the best method of editing and dealing with manuscripts… [I] use them frequently"* [P10].

### 5.3.3.4 Dictionaries, biographies, directories

It was agreed among writers and authors that researchers and editors of Arabic manuscripts are obliged to use dictionaries, glossaries, biographies, directories, etc. during their research activities (Harun, 1965) (Munajjid, 1987). Interviewees reported the importance of these resources:

> *"..[R]eferring back to dictionaries; such as Lisan al-`arab is our duty; many terms require you to find out their meaning and state the meaning to the readers"* [P13].

*"... researchers, students and editors cannot conduct research without audat almuhaqiq [research tools] such as dictionaries, atlases, biographies, directories and reference works (e.g. Sahih al-Bukhari)"* [P2].

*"...editors frequently need to consult dictionaries and thesauri, because manuscripts were written in classic [medieval] Arabic language, and many of the words are not used now. I recommend my students to keep dictionaries close by at all times"* [P4].

### 5.3.3.5 Theses and dissertations

Previewing previous theses and dissertations can be useful to learn about previous efforts to edit and publish Arabic manuscripts. Some academic departments create rules and regulations when editing Arabic manuscripts that the selected manuscript must not been edited before and no one else is editing the same manuscript in any part of the world, or at least locally. Researchers and editors should make sure that the selected manuscript has not already been edited in book form or for obtaining an academic degree.

*"... I had to search available thesis and dissertation directories in the KSA and contact many departments to prove that my current manuscript had not been edited nor was being edited... [M]y supervisor asked me to contact some departments in Egypt for the same reason"* [P11].

*"We are working in a systematic research community, so we ask our students to choose an unedited manuscript for their masters or PhD research. Our target is to edit and publish as much as we can under the academic and scientific umbrella... they have to survey dissertation*

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*directories, and contact other departments to be sure of whether the*

*manuscript has been edited or not"* [P3].


### 5.3.3.6 Journals and Proceedings

Some interviewees mentioned that journals and proceedings that are concerned with Arabic manuscripts are commonly used.

*"Many articles and conference papers contain valuable information about*

*manuscripts. Researchers should be aware of these resources"* [P7].


*"The Arabic manuscript editing process requires deeper knowledge on the*

*part of an editor; journals, and proceedings are some of the resources that*

*an editor needs"* [P5].


### 5.3.3.7 Online and electronic resources

A number of studies have reported that humanities researchers have experience in using online resources (Buchanan et al., 2005; Rimmer et al., 2006; Tahir et al., 2010). In the context of this research, all interviewees mentioned that they have dealt with and used online sources such as electronic databases (e.g. Index Islamicus), e-forums (e.g. Multaqaa Ahl Al Hadith), digital libraries (e.g. WDL), Wikis (e.g. marefa.org), and libraries' OPACs,
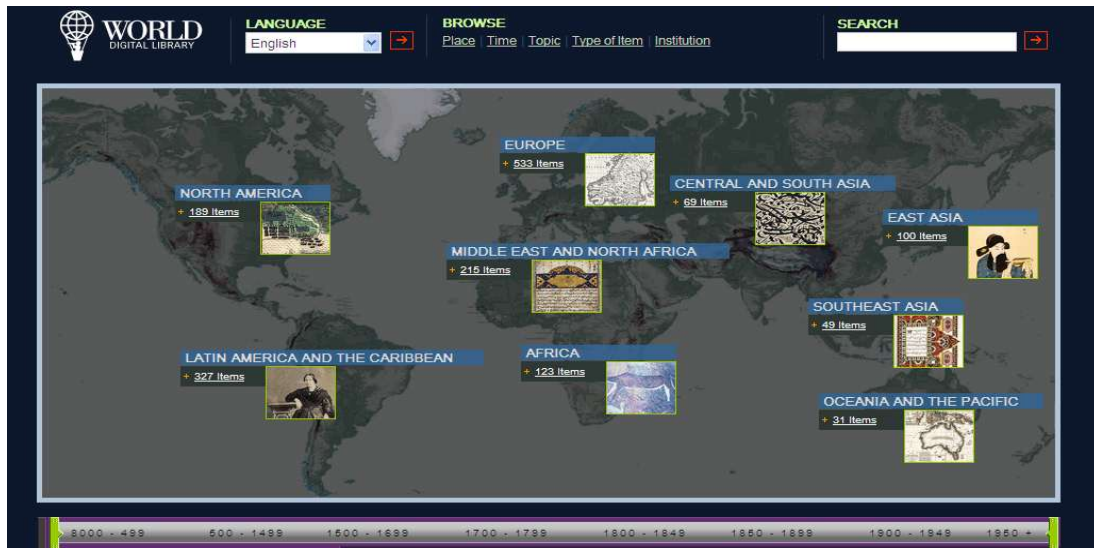
**Figure 5-8: World Digital Library (WDL) (Screenshot)**

Most interviewees indicated that e-forums were one of the most commonly-used online sources. Some interviewees supported the use of e-forums, while some were unsupportive.

> *"… E-forums provide members with very helpful services that may not be obtained anywhere else; for instance, they are good places to share knowledge, ask for guidance, get manuscript copies, and so on"* [P7].

P13 described his experience of taking advantage of e-forums:

> *"I was looking for a copy of a manuscript via the Internet and I found a description of the manuscript in …[one e-forum]…, but this copy was in [location of] library. I asked in the e-forum if someone could photocopy it and I left my contact details. Someone scanned that manuscript and e-mailed it to me with cost per page. If I had followed traditional methods, I would have waited for months".*

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**Figure 5-9: Canon of Medicine by Avicenna showed in Marefa Wiki (Screenshot)**

Opponents of using e-forums reported that e-forums could provide unreliable information. Citing and quoting information from e-forums, blogs and personal websites is not recommended by academia in the KSA.

> *"Therefore, [I] warn my students about directly citing information from e-forums, for instance. We should not trust such information"* [P1].

P8 reported that e-forum users might be exploited by scammers.

> *".. [A] colleague was looking for a manuscript via one e-forum and he received an e-mail via that e-forum to pay for the manuscript and he made a bank transfer. Unfortunately, he did not receive what he paid for".*

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However, using e-forms and/or personal websites for searching for or locating Arabic manuscripts was acceptable to some interviewees, with some caution advised.

*"There is no doubt that the Internet, nowadays, provides fast access to resources. Therefore, many researchers and students have used the internet to locate a desirable manuscript, and this is acceptable. However, the researcher should be wary, and take serious care when dealing with websites for searching and quoting"* [P4].

With regard to using digital libraries that provide access to Arabic manuscripts via the internet, some interviewees have mentioned a number of digital libraries.

*"There are some websites nowadays that provide images of Arabic manuscripts, such as the Multaqa Ahl Alhadeeth e-forum, Alalukah e-forum, WDL, and recently a number of libraries have made some of their collection available online, for example King Saud University Library [PSL]. This library contains hundreds of manuscripts that can be previewed online [web image] and downloaded in PDF"* [P2].

*"...[I] have browsed many websites that contain Arabic manuscript images in different parts of the world. These websites were very helpful, and, therefore, I have subscribed to some of them as a member. A number of years ago, Al Azhar University made good quality Arabic manuscript images available on the internet…. Some libraries tend to provide Arabic manuscripts via the internet, such as Süleymaniye Library, Princeton University Library, WDL, and, locally, King Saud University, King Abdulaziz Public Library"* [P6].

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*"... Some [digitised] Arabic manuscripts at Umm Al Qura University [KAAUL] were available online to browse and download, as well as full-text of some theses, but this is now suspended ... I use many e-forums and digital library to search for and locate manuscripts, and in addition for finding helpful information"* [P8].

It is worth mentioning that the term "digital library" was not frequently used by interviewees. The terms most frequently mentioned by interviewees were as follows:

**Table 5-7: Terms Frequently Used Terms by Interviewees**

| Term | No. of Interviewees who used term |
|---|---|
| **Website (موقع)** | 13 |
| **E-forum (منتدى)** | 12 |
| **OPAC (فهرس آلي)** | 8 |
| **Online or electronic database (قواعد بيانات الالكترونية)** | 7 |
| **Digital library, and/or Electronic library ( مكتبة رقمية او مكتبة الالكترونية)** | 5 |
| **Social networking, such as Facebook, Twitter (مواقع اجتماعية)** | 4 |
| **Newsgroups (المجموعات البريدية)** | 2 |
| **Blog, and/ or wiki (مدونة او ويكي)** | 2 |

### 5.3.4 Accessing Arabic Manuscripts

Interviewees were asked to report their most significant challenges, difficulties, and barriers to accessing Arabic manuscripts. Respondents categorised these as follows:

### 5.3.4.1 Publicity of Arabic manuscripts

A number of interviewees mentioned a lack of bibliographic controls over tools such as catalogues, bibliographies, and handlists.

> *"...many Arabic manuscripts around the world are hidden up to now, because they are as yet uncatalogued. Therefore, we don't know where these manuscripts are kept"* [P3].

Others mentioned that libraries and archive centres have not taken initiatives in updating their catalogues of new manuscripts that have been acquired.

> *"[Some] libraries have acquired new manuscripts, and they have not even issued a list of these manuscripts... a collection of Arabic manuscripts has been donated to [Name of Library] that contains very rich of Arabic manuscripts. When I asked the librarian about a manuscript in this collection, he stated that this collection has not been catalogued yet. I am sure that the manuscript is in that collection, because the donor has edited that manuscript before and published his editing in a book"* [P6].

**5.3.4.2 Location of holding Arabic manuscripts**

It seems that the Arabic manuscripts scattered around the world is a crucial issue for manuscriptologists. This issue was reported by a number of studies that have addressed the status of Arabic manuscripts, such as (Sayyid, 1997; Roper, 1992), and (Sa`Ati, 1993).

*The location of Arabic manuscripts is one of the difficulties that manuscriptologists may face. Sometimes a manuscriptologist needs to travel to request a [surrogate] of a manuscript; this would also cost money and time* [P5].

*"Undoubtedly, access to [Arabic] manuscripts which are held in different geographical location is the most significant barrier that faced students, researchers. Therefore, researchers or students should take this issue in their account before conducting his [or her] research or editing. If he [or she] could not overcome this barrier, he [or she] should find another affordable Arabic manuscript to be edited. Therefore, we are asking our students to state the location of the selected Arabic manuscript and their ability to reach and access it in their research proposal for MA and PhD degree"* [P2].

Therefore, number of studies hypothesise that digital libraries can play a significant role in overcoming this issue by make Arabic manuscripts available online, and reduce the time consumed as mentioned by ((Crane, 2002), (Le Bourgeois et al., 2004), (Agosti et al., 2007b) and (Al-Khatib et al., 2007)).

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**5.3.4.3 Surrogates of Arabic manuscripts**

Alternative formats (i.e. surrogates) of Arabic manuscripts such as; photocopied on paper, microfilmed, and scanned/imaged Arabic manuscripts, are among reported issues. The work of manuscriptologists is focused on reading, so they require an adequate alternative to accomplish their task.

*"...one of the problems associated with reading a manuscript is the surrogate, which can be of bad photocopied quality, which makes it difficult to read the manuscript "* [P2].

Scanning and digital images of Arabic manuscripts were reported as an issue if there is no standard for digitisation. Issues in this regard are, for instance;

- Lack of quality and resolution of image,

- The provided format of image (TIFF, JPEG, PNG, etc.) may not be convenient for browsing or downloading,

- Using some image software (e.g. Photoshop) that could affect the clarity of the image.

*"... I believe that [library name] made a big mistake when they put their logo as the background of each scanned Arabic manuscript page… many features of the manuscript then disappeared. For example, the type of paper cannot be recognised"* [P3].

## 5.3.5 Digital Library Requirements of Interviewed End-users

Interviewed end-users were asked to report their requirements for establishing a digital library of Arabic manuscripts in order to fulfil their needs. Their requirements were as follows:

### 5.3.5.1 Content Management

The majority of interviewees stressed the necessity of providing descriptive data (i.e. metadata) of Arabic manuscripts.

> *"We need a digital library to perform the role of the [traditional] library through providing Arabic manuscript images and their cataloguing records. Also, we need the ability to use this library to search other libraries' catalogues"* [P1].

> *"As a researcher, bibliographic data are as important as a manuscript itself."* [P6].

It was mentioned by P2, P3, P6, P8, and P10 that Arabic manuscripts, if they are going to be available online, must be provided using an organised and systematic approach, via, for instance, a digital library system.

> *"Arabic manuscripts should be respected and not be vulnerable… they should be provided via a system that secure and saves these manuscripts… [UNESCO] has launched a digital library of some manuscripts. Our institution should take advantage of such a project"* [P3].

**5.3.5.2 Content Administration**

A number of interviewed end-users mentioned control of access to the manuscripts by providers. This involves management of access to manuscripts which are available online.

*"... [M]aking the whole Arabic manuscript collection of the university library available online will lead to misuse of these manuscripts, and will conflict with our academic role in editing Arabic manuscripts. A number of Arabic manuscripts in the library are preserved by our department because our students are working on editing them as part of their academic degrees. So, I think [the] library should manage access to the manuscripts by the public"* [P3].

*"...when I start editing a manuscript I request the librarian to reserve this manuscript so that others cannot do what I am doing... so not all manuscripts should be available online"* [P13].

**5.3.5.3 Services and Interface of the Digital Library**

Another of the requirements mentioned was integration of knowledge by providing primary, secondary, and tertiary sources of information in a digital library.

*"I believe that providing such dictionaries, bibliographies, and directories in the digital library with the ability to locate information will help users in their editing"* [P4].

The facility to zoom in/out of the digitised Arabic manuscripts was reported as a requirement by the following interviewees: P1, P3, P4, P6, and P8. The need to integrate an e-forum into a digital library was reported by P7, P10, and P13.

## 5.4 Summary

This chapter presented extracts from and a discussion of face-to-face semi-structured interviews conducted with 10 Arabic manuscript providers in the KSA, and with 14 end-users. The results of the coding of the interview data revealed the following key findings;

*Interviewed Arabic manuscripts providers:*

- Arabic manuscript providers in the KSA hold 288797 Arabic manuscripts.

- They provide access to their Arabic manuscripts collections to users.

- Four providers reported that the have manuscripts conversion laboratories.

- All providers use automation system to manage their Arabic manuscripts' collections.

- All providers reported un-cataloguing issue of Arabic manuscripts.

- All providers reported that they have been digitised their orginal Arabic manuscripts by the contractor of KFNL.

- Just two Arabic manuscript providers have set up some of their manuscripts online, and four providers showed their interest to establish digital libraries.

- Some providers disagreed with making their Arabic manuscripts available online due to several issues regarding the identity of the library, security, technical aspects, and misuse.

- Arabic manuscript providers appeared to focus on the technical side of the content management system and some standards that should be implemented.

- Arabic manuscript providers also focus on security, policy, and regulation of the usage of such a digital library of Arabic manuscripts.

*Interviewed End-users*:

- End-users use Arabic manuscripts for their teaching and researching activities.

- End-users show their need to access other resources (e.g. secondary resources)

- The majority of interviewed end-users have used online resources, and some have reported using digital libraries of Arabic manuscripts.

- Five interviewed end-users mentioned the term of "digital library and/or electronic library".

- Majority of interviewed end-users reported issues recording and un-cataloguing of Arabic manuscripts.

- Lack of digitisation standards by Arabic manuscripts' providers has been reported by number of interviewed end-users.

- End-users appeared to pay considerable attention to the provision of bibliographic data for Arabic manuscripts.

- Fair access to Arabic manuscripts' collection is required by end-users.

- Most end-users were in agreement with the implementation of a clear policy for using a digital library, to avoid certain issues such as repeat editing. They also expressed a desire for involvement in this process.

# CHAPTER SIX QUESTIONNAIRE ANALYSIS AND DISCUSSION

## 6.1 Introduction

This chapter presents the second approach (quantitative approach) of the study methodology. As previously mentioned (Chapter Four; see 4.3.3 ), a survey questionnaire was distributed among the volunteer sample, in order to obtain a broader and deeper insight into users' requirements. The survey took place over three months (01/10/2009 to 31/01/2010), and was run in four cities in the KSA. The questionnaire contained close- and open-ended questions. All questions and answers will be presented in this chapter. Statistical Product and Service Solutions (SPSS) was used to analyse the gathered data. A chi-squared test was utilised to determine whether there is any statistical significance between participants' Internet usage data. The Mann-Whitney U Test was applied to the non-parametric data (Chapter Two; see 4.3.3.4).

## 6.2 Type of Analyst Questionnaires

**Table 6-1: Type of Analyst Questionnaires**

| Type | Number | % |
|------|--------|---|
| Paper-based | 68 | 39 |
| Online | 107 | 61 |
| Total | 175 | 100 |

Table 6-1 shows the number of questionnaires analysed. As reported in Chapter Four, 200 paper-based questionnaires were distributed to the volunteer sample at libraries in the KSA (see page 148). There were 82 returned paper-based questionnaires, equalling 41% of the total distributed paper-based questionnaires. 68 completed paper-based questionnaires were analysed. Fourteen paper-based questionnaires were excluded as result of incomplete answers. 107 valid online questionnaires were analysed. Six online questionnaires were excluded due to non-completion. As discussed in the Chapter Four: Research Methodology, 63 participants were directly invited by e-mail, and threads were posted on two specialised e-forums in Arabic manuscripts inviting participation in the questionnaire survey. Valid analysis of questionnaire data was dependent on completed responses to all questions.

## 6.3 Demographic Characteristics

The questionnaire presents participants' demographic characteristics: gender, age, education, and occupation. This demographic data gives a clear picture of the participants in the questionnaire survey. The results are as follows:

### 6.3.1 Participants' Gender

**Table 6-2: Respondents' Gender**

| Sex | Number | % |
|---|---|---|
| Male | 144 | 82 |
| Female | 31 | 18 |
| Total | 175 | 100 |

Unsurprisingly, Table 6-2 shows that the majority of participants were male (144), while just 31 were female. This may be due to the inability of female participants to receive the paper-based questionnaires, due to the segregation of men and women in libraries in the KSA.

**Table 6-3: Gender Distribution of Participants According to Type of Questionnaire**

| Variables | Paper-based questionnaire | Online questionnaire | Total |
|---|---|---|---|
| Male | 69 | 75 | 144 |
| Female | 2 | 29 | 31 |
| Total | 71 | 104 | 175 |

The online questionnaire shows a higher participation of women than in the paper-based questionnaire (29 participants, 2 participants, respectively), as demonstrated in Table 6-3. This may be one of the benefits of utilising an online questionnaire in such a closed society.

### 6.3.2 Participants' Age

**Table 6-4: Age of the Respondents**

| Age | Number | % |
|---|---|---|
| Under 17 | 0 | 00.0 |
| 17-30 | 48 | 26.9 |
| 31-43 | 74 | 42.3 |
| 44-56 | 46 | 26.3 |
| Over 57 | 7 | 4.0 |
| Total | 175 | 100 |

Almost half of the participants (42.3%) were in the 31–43 age range. This was closely followed by the number of respondents aged between 17-30 and 44-56 (48 and 46, respectively). It is noticeable that there was no response from those aged under seventeen. This is because seventeen is the minimum age for enrolment in a programme of undergraduate study in the studied environment.

### 6.3.3 Participants' Educational Level

**Table 6-5: Participants' Educational Level**

| Education Level | Number | % |
|---|---|---|
| Secondary school | 12 | 6.9 |
| Bachelor degree | 56 | 32.0 |
| Masters | 48 | 27.4 |
| PhD | 54 | 30.9 |
| Other | 5 | 2.9 |
| Total | 175 | 100.0 |

Table 6-5 shows the distribution ratios of the educational level of participants into three main categories; Bachelor, Masters, and PhD degrees. 56 respondents had earned a Bachelor degree as their highest-level qualification (approximately 32%); 54 were PhD holders, 30.9% of the participants; 48 respondents had earned Masters Degrees (27.4%). Five respondents (2.9%) reported that they had earned either a Higher Diploma or College Diploma. Twelve participants reported that they had earned a secondary school certificate as their highest level of education.

### 6.3.4 Participants' occupation or vocation

**Table 6-6: Participants' Occupation**

| Participant Description | Number | % |
|---|---|---|
| Undergraduate Student | 6 | 3.1 |
| Postgraduate Student | 46 | 23.7 |
| University Staff Member | 54 | 27.8 |
| Researcher | 44 | 22.7 |
| Librarian | 31 | 16 |
| Arabic Manuscript Broker/Collector | 2 | 1 |
| Other | 11 | 5.7 |
| Total | 194 | 100 |

Table 6-6 demonstrates the occupations or vocations of research participants. Respondents were given this multiple-choice question and asked to select all applicable answers. Therefore, there were 194 responses in total. Nineteen participants chose a second occupation, either from the list provided (e.g. a university staff member described him/herself as an Arabic manuscript collector, seven researchers described themselves as postgraduate students; one researcher as an Arabic manuscript collector) or by choosing other work (e.g. Research Centre Manager, private sector). A significant number of participants in this survey were university staff members, 54 in total. Postgraduate students and researchers were the second and third most frequent responses (46 and 44, respectively). Thirty-one librarians participated in this survey.

## 6.4 Participants' Experiences and Skills

Participants' length of experience with Arabic manuscripts and ICT skills were both explored by the questionnaire. These results are presented below.

### 6.4.1 Participants' Length of Experience with Arabic Manuscripts

**Table 6-7: Participants' Experience**

| Experience Period | Number | % |
|---|---|---|
| Less than a year | 41 | 23.4 |
| 1 to 3 | 44 | 25.1 |
| 4 to 6 | 23 | 13.1 |
| More than 6 years | 57 | 32.5 |
| Prefer not to answer | 10 | 5.7 |
| Total | 175 | 100 |

Fifty-seven (32.57%) participants had more than six years of experience of dealing with Arabic manuscripts, as shown in Table 6-7. Respondents were asked to report their approximate experience period if they chose the over six years option as an open-ended question. The Mean of their experience period is 9 years. 41 participants had less than a year of experience. This figure is unsurprising, as the surveys were conducted at the beginning of the academic year (2009-2010) in the KSA.

### 6.4.2 Participants' ICT Skills

**Table 6-8: Participants' ICT**

| Variable | Number | % |
|---|---|---|
| Excellent | 46 | 26.3 |
| Very good | 62 | 35.4 |
| Good | 44 | 25.1 |
| Quite good | 18 | 10.3 |
| Weak | 3 | 1.7 |
| Prefer not to answer | 2 | 1.1 |
| Total | 175 | 100.0 |

Respondents were asked to evaluate their ICT skills. Sixty two participants evaluated their ICT skills as very good. A response of excellent was the second most frequent, with 46 responses. 44 participants evaluated their ICT skills as good. Three respondents considered their ICT skills to be weak. Therefore, it can be stated that Arabic manuscripts users are experienced in the use of ICT, as a result of a long period of utilising technologies related to manuscripts, e.g. microforms.

## 6.5 Arabic Manuscript and Internet

Participants were asked to indicate their internet usage, online resources, and location of online Arabic manuscripts via the internet websites, digital libraries, e-forums, etc.

### 6.5.1 Participants Internet Usage for Research

**Table 6-9: Using Internet for Research**

| Variable | Number | % |
|----------|--------|---|
| No | 23 | 13.1 |
| Yes | 152 | 86.9 |
| Total | 175 | 100 |

Table 0-11 presents participants' responses about using the Internet for their scientific research. Most of the respondents (n=152, 86.9%) reported that they use the internet for scientific research. However, twenty-two (13.1%) participants did not use the internet for this purpose.

To give a clear picture of respondents who have used the internet for their research according to analysed demographic data (i.e. gender, age, qualification, experience), the following cross-table is presented. A null hypothesis was considered, as there is no statistical significance of participants' characteristics on using the internet for research. Therefore, a Chi-squared($X^2$) test was applied.

**Table 0-10: Participants' Characteristics of Using the Internet for Research**

| Internet for research / Variable | | Yes | | No | | Total | | $X^2$test | df | @0.05 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % | | | |
| Gender | Male | 124 | 86.1 | 20 | 13.9 | 144 | 100 | 0.396 | 1 | 0.529 |
| | Female | 28 | 90.3 | 3 | 9.7 | 31 | 100 | | | |
| | Total | 152 | 86.9 | 23 | 13.1 | 175 | 100 | | | |
| Age | 17-30 | 41 | 85.4 | 7 | 14.6 | 48 | 100 | 3.506 | 3 | 0.320 |
| | 31-43 | 63 | 85.1 | 11 | 14.9 | 74 | 100 | | | |
| | 44-56 | 43 | 93.5 | 3 | 6.5 | 46 | 100 | | | |
| | Over 57 | 5 | 71.4 | 2 | 28.6 | 7 | 100 | | | |
| | Total | 152 | 86.9 | 23 | 13.1 | 175 | 100 | | | |
| Qualification | Secondary | 8 | 66.7 | 4 | 33.3 | 12 | 100 | 6.781 | 4 | 0.148 |
| | Bachelor | 47 | 83.9 | 9 | 16.1 | 56 | 100 | | | |
| | Masters | 43 | 89.6 | 5 | 10.4 | 48 | 100 | | | |
| | PhD | 50 | 92.6 | 4 | 7.4 | 54 | 100 | | | |
| | Other | 4 | 80 | 1 | 20 | 5 | 100 | | | |
| | Total | 152 | 86.9 | 23 | 13.1 | 175 | 100 | | | |
| Arabic Manuscripts Experience Period | Less than a year | 37 | 87.8 | 6 | 12.2 | 41 | 100 | 0.174 | 3 | 0.982 |
| | 1-3 | 41 | 88.6 | 5 | 11.4 | 44 | 100 | | | |
| | 4-6 | 21 | 87 | 4 | 13 | 23 | 100 | | | |
| | More than 6 years | 53 | 86 | 8 | 14 | 57 | 100 | | | |
| | Total | 152 | 87.3 | 23 | 12.7 | 175 | 100 | | | |

It can be observed that the percentage of women who use the internet for their research (90.3%) is higher than that of men (86.1%). Elderly respondents (28.6%) appear to use the internet for research less than younger respondents. With regard to qualifications, the data shows that gaining higher-level qualifications correlates with use of the internet for research (e.g. PhD 92.6%, Masters 89.6%, Bachelor 83.9%). The above table shows that participants who have a long period of experience with Arabic

manuscripts (86%) are less likely to use the internet for research than more junior participants (87.8%).

The above table shows the values of the $X^2$ test to gender, age, qualification, and Arabic manuscripts experience period are 0.396, 3.506, 6.781, and 0.174, respectively. Moreover, there is no statistical significance of these characteristics of participants on using the Internet for research.

### 6.5.2 Participants' Internet Resources

**Table 6-10: Internet Resources**

| Answer / Websites | Yes | | No | | Score | Weighted Mean (μ) |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | | |
| Personal websites | 63 | 41.4 | 89 | 58.6 | 215 | 15.58 |
| E- Forums | 95 | 62.5 | 57 | 37.5 | 247 | 17.9 |
| Digital Libraries | 110 | 72.4 | 42 | 27.6 | 262 | 18.99 |
| Blogs | 51 | 33.6 | 101 | 66.4 | 203 | 14.71 |
| News groups | 39 | 25.7 | 113 | 74.3 | 191 | 13.84 |
| Library/Museum/Archive websites | 110 | 72.4 | 42 | 27.6 | 262 | 18.99 |
| Total | | | | | 1380 | 100 |

Participants were asked to indicate the internet resources on which they most relied for scientific research. Table 6-10 shows that using library/museum/archive centre websites and digital libraries were equally popular among respondents (n=110, 72.4%, score=262, μ=18.99). These two internet resources were the most commonly reported as reliable of the list shown. More than half of participants (62.5%, score=247) indicated

that electronic forums are one of their preferred resources for conducting scientific research. Personal and government websites came in third place (n=63, 41.4%, score=215, μ=15.58). Participants reported blogs and wikis in fourth place, and news groups in fifth place (score=203 and score=191, respectively).

Participants were given an additional open-ended option to state other preferred internet resources. Six participants stated that they use other internet resources, which were search engines and electronic databases.

### 6.5.3 Searching for Arabic Manuscripts via the Internet

Participants were asked to indicate whether they use the Internet to locate and access Arabic manuscripts. Responses are illustrated in Figure 6-1:
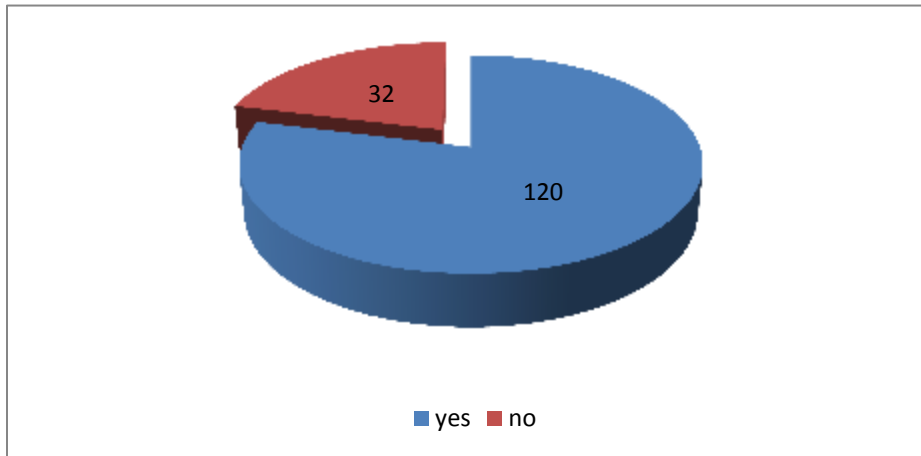


**Figure 6-1: Searching the Internet for Arabic Manuscripts**

120 of the respondents replied that they have used the internet to search for Arabic manuscripts. However, thirty-two respondents stated that they have not used the internet to search or browse for Arabic manuscripts via the internet.

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Distribution of participants' characteristics (i.e. gender, age, qualification, and Arabic manuscript experience period) according to their experience in searching for Arabic manuscripts via the internet is demonstrated in the following table:

**Table 6-11: Participants' Characteristics of Searching for Arabic manuscripts via the Internet**

| Internet for Arabic Manuscripts Variable | | Yes | | No | | Total | | $X^2$test | df | @0.05 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % | | | |
| Gender | Male | 100 | 80.6 | 24 | 19.4 | 124 | 100 | 1.167 | 1 | 0.282 |
| | Female | 20 | 71.4 | 8 | 28.6 | 28 | 100 | | | |
| | Total | 120 | 78.9 | 32 | 21.1 | 152 | 100 | | | |
| Age | 17-30 | 33 | 80.5 | 8 | 19.5 | 41 | 100 | 2.016 | 3 | 0.569 |
| | 31-43 | 48 | 76.2 | 15 | 23.8 | 63 | 100 | | | |
| | 44-56 | 36 | 83.7 | 7 | 16.3 | 43 | 100 | | | |
| | Over 57 | 3 | 60 | 2 | 40 | 5 | 100 | | | |
| | Total | 120 | 78.9 | 32 | 21.1 | 152 | 100 | | | |
| Qualification | Secondary | 5 | 62.5 | 3 | 37.5 | 8 | 100 | 2.981 | 4 | 0.561 |
| | Bachelor | 39 | 83 | 8 | 17 | 47 | 100 | | | |
| | Masters | 33 | 76.7 | 10 | 23.3 | 43 | 100 | | | |
| | PhD | 39 | 78 | 11 | 22 | 50 | 100 | | | |
| | Other | 4 | 100 | 0 | 0 | 4 | 100 | | | |
| | Total | 120 | 78.9 | 32 | 21.1 | 152 | 100 | | | |
| Arabic Manuscript Experience Period | Less than a year | 21 | 56.8 | 16 | 43.2 | 37 | 100 | 14.608 | 3 | 0.002 |
| | 1-3 | 36 | 87.8 | 5 | 12.2 | 41 | 100 | | | |
| | 4-6 | 18 | 85.7 | 3 | 14.3 | 21 | 100 | | | |
| | More than 6 years | 45 | 85 | 8 | 15 | 53 | 100 | | | |
| | Total | 120 | 78.9 | 32 | 21.1 | 152 | 100 | | | |

This cross-table shows that males (80.6%) use the internet to search for Arabic manuscripts to a greater extent than females (71.4%). This result is in contrast with the result in Table 6-11, which indicates that women use the internet for general research more than men. Elderly respondents (40%) use the Internet for locating Arabic manuscripts less than younger respondents. It can be observed from the data that the highest percentage of non-internet-users is comprised of participants who have earned secondary school certification as their highest level of education. It is notable that more junior respondents (i.e. those who have less experience with manuscripts) display the highest percentage of not using the Internet for locating Arabic manuscripts (43.2%). The most experienced participants (over 6 years) hold second place as non- Internet users (15%). In contrast, the table shows that younger participants are heavy internet users for general research, and older respondents display a contrary tendency

The above table presents the values of $X^2$ test of gender, age, qualifications, and Arabic manuscript experience period as 1.167, 1.016, 2.981, and 14.608, respectively. There is statistical significance for Arabic manuscript experience period (0.002). This could refer to the high number of less-experienced participants who reported that they do not use the internet for locating Arabic manuscripts.

**6.5.4 Participants Searching via the Internet**

**Table 6-12: Participants Searched For**

| Answer / Variable | Yes | | No | | | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | Score | Weighted Mean (μ) |
| Arabic manuscript images | 92 | 52.6 | 28 | 16 | 212 | 15.67 |
| Arabic manuscript author biographies | 44 | 25.1 | 76 | 43.4 | 164 | 12.12 |
| Scanned Arabic manuscript printed-catalogues | 59 | 33.7 | 61 | 34.9 | 174 | 13.23 |
| Arabic manuscript text-books | 40 | 22.9 | 80 | 45.7 | 160 | 11.83 |
| Arabic manuscript reference works (dictionaries, atlases, etc..) | 33 | 18.9 | 87 | 49.7 | 153 | 11.31 |
| Seeking guidance or help | 31 | 17.7 | 89 | 50.9 | 151 | 11.16 |
| Total | | | | | 1353 | 100 |

The above table demonstrates respondents' previous experience of searching via the internet for Arabic manuscripts. Searching for Arabic manuscript images was the respondents' principal previous experience in searches of this type (n=92, 52.6%, score=212, μ=15.67). Other resources or materials show much closer ratios; less than 50% of these were positive responses in all cases. Fifty-nine (33.7%) respondents indicated that they have searched for scanned printed catalogues of Arabic manuscripts. This may be due to the tendency of many libraries, museums and archive centres to publish their Arabic manuscript printed catalogues, which are then scanned and made available via digital media (e.g. AMS printed-catalogue of Princeton University). From the previous analysis, it can be observed that accessing and locating Arabic manuscripts is the most frequent purpose for searching the internet. Searching for secondary resources (e.g. authors' biographies, text-books, reference works) were the second most common

purpose for using the Internet (25.1%, 22.9%, and 18.9% respectively). Seeking guidance or assistance was the third most frequently-stated purpose (17.7%).

**6.5.5 Website Used for Searching by Respondents**

**Table 6-13: Websites Used**

| Website | Frequency | % |
|---|---|---|
| **Multaqa Ahl Alhadeeth e-forum (ahlalhdeeth.com/vb)** | 89 | 51 |
| **King Faisal Centre for Research and Islamic Studies OPAC** | 78 | 45 |
| **Alwaraq website (alwaraq.net)** | 65 | 37 |
| **Waqfeya Library** | 61 | 35 |
| **Alalukah e-forum** | 61 | 35 |
| **Digital Library of King Saud University's manuscripts** | 60 | 34 |
| **King Fahad National Library OPAC** | 57 | 33 |
| **Wadod Centre for Manuscripts (wadod.com)** | 56 | 32 |
| **World Digital Library (WDL)** | 36 | 21 |
| **Digitized Arabic Manuscripts at the American University of Beirut Library** | 24 | 14 |
| **Islamic Heritage Project: Harvard University Library** | 12 | 7 |

Respondents were asked to state the names of all websites (digital libraries, blogs, e-forums, libraries' OPACs) which they have used for searching for and locating Arabic manuscripts via the web. This question was open-ended. The Multaqa Ahl Alhadeeth e-forum was the most frequently-used by respondents (n=89, 51%). In second place was the King Faisal Centre for Research and Islamic Studies OPAC (n=78, 45%). Sixty-five respondents (37%) indicated that they have used the Alwaraq website. The digital library of King Saud University's manuscripts was in sixth place (n=60, 34%). Moreover, the last three websites used by respondents were categorised as digital libraries. These digital libraries are the WDL, Digitized Arabic Manuscripts at the American University of

Beirut Library, and the Islamic Heritage Project: Harvard University Library. It may be worthy of mention that the WDL and Islamic Heritage Project: Harvard University Library were launched in the same year as this research data was gathered. WDL was launched on 21 April 2009 (30). In late 2009 the Islamic Heritage Project website was launched for the public. This may explain the paucity of their mention by respondents.

**6.5.6 Importance of the Internet as Research Tool for Arabic Manuscripts**

**Table 6-14: Importance of the Internet**

| Variable | Number | % |
|---|---|---|
| Important | 128 | 84.2 |
| No preference | 9 | 5.9 |
| Not important | 15 | 9.9 |
| Total | 152 | 100 |

Participants were asked to evaluate the importance of the internet as a tool for research on Arabic manuscripts. The majority of respondents (n=128, 84.2%) reported that they consider the internet to be an important tool for this purpose. However, fifteen respondents (9.9%) stated that they do not consider the internet to be important as a research tool for Arabic manuscripts. Nine participants (5.9%) did not express a preference.

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[30] World Digital Library website. Available at: http://www.wdl.org/en/about/background.html . Last accessed 4/5/2011.

Participants were asked to give reason/s for their choice as an open-ended question. The majority of participants who considered the internet to be important stated the reasons as:

- Fast and easy access to Arabic manuscripts via the internet.
- Low cost of using and accessing Arabic manuscripts via the internet.
- The emergence of websites (e.g. e-forums, digital libraries, etc) serving Arabic manuscripts.

Conversely, respondents who deem the internet to be not important as a research tool for searching for Arabic manuscripts via the internet gave the following reasons:

- Distrust of the digital content.
- The rarity of digitised Arabic manuscripts available via the internet.
- The lack of professional websites serving Arabic manuscripts.
- The lack of security on the internet.

## 6.6 Users' Requirements

### 6.6.1 Preferred Alternative Media for Browsing Arabic Manuscripts

**Table 6-15: Preference of Media**

| Answer / Variable | Like best No. | % | Like No. | % | Neutral No. | % | Do not like No. | % | Do not like at all No. | % | Score | Weighted Mean ($\mu$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arabic manuscript image on digital media | 86 | 56.6 | 46 | 30.3 | 13 | 8.6 | 4 | 2.6 | 3 | 2 | 664 | 39.59 |
| Paper-based Arabic manuscript | 57 | 37.5 | 45 | 29.6 | 30 | 19.7 | 13 | 8.6 | 7 | 4.6 | 588 | 35.07 |
| Arabic manuscript in microform | 15 | 9.9 | 36 | 23.7 | 35 | 23 | 35 | 23 | 31 | 20.4 | 425 | 25.34 |
| Total | | | | | | | | | | | 1677 | 100 |

Table 6-15 shows respondents' alternative preference media for browsing Arabic manuscripts. It is clear that browsing Arabic manuscripts in digital formats, such as CD-ROMs or digital libraries, is the most preferred option to respondents (score=664, $\mu$=39.59). Browsing Arabic manuscripts on paper-based formats was the second most preferred medium (score=588, $\mu$=35.07). Microforms media (e.g. microfilms, or microfiches) were the least popular alternative for browsing Arabic manuscripts by respondents (score=425, $\mu$=25.34).

### 6.6.2 Digital Library Functions

**Table 6-16: Digital Library Functions**

| Answer / Variable | Very important No. | % | Important No. | % | No preference No. | % | Less important No. | % | Not important No. | % | Score | Weighted Mean (μ) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bibliographic data (metadata) of Arabic manuscripts | 102 | 67.1 | 28 | 18.4 | 6 | 3.9 | 6 | 3.9 | 10 | 6.6 | 662 | 17.68 |
| Arabic manuscript images | 91 | 59.9 | 25 | 16.4 | 21 | 13.8 | 10 | 6.6 | 5 | 3.3 | 643 | 17.17 |
| Integration of knowledge providing researcher references | 68 | 44.7 | 37 | 24.3 | 21 | 13.8 | 11 | 7.2 | 15 | 9.9 | 588 | 15.71 |
| Federated search engine for libraries' OPACs | 99 | 65.1 | 28 | 18.4 | 10 | 6.6 | 9 | 5.9 | 6 | 3.9 | 661 | 17.65 |
| Integration of communication via e-forum, blog, and/or wiki | 78 | 51.3 | 28 | 18.4 | 25 | 16.4 | 11 | 7.2 | 10 | 6.6 | 609 | 16.27 |
| Total | | | | | | | | | | | 3744 | 100 |

Respondents were asked to rank the importance of digital library functions. Access to knowledge and locating resources were ranked as the most important functions by respondents. These functions are facilitated through the provision of Arabic manuscript descriptive data (metadata) (score=662, μ=17.68), and creating ways of locating Arabic manuscripts via provision of federated search engines of other libraries' OPACs (score=661, μ=17.65). The second most important function was stated to be providing Arabic manuscript images (primary source) (score=643, μ=17.17). Scholarly communication via e-forums, blogs, or wikis was in third place (score=609, μ=16.27). Integration of knowledge by providing researcher resources and references was rated as the fourth most important function of digital libraries of Arabic manuscripts (score=588, μ=15.71).

**6.6.3 Arabic Manuscript Retrieval via a Digital Library**

**Table 6-17: Preferred Retrieval Methods**

| Answer / Variable | Like best | | Like | | Neutral | | Do not like | | Do not like at all | | Score | Weighted Mean (μ) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % | No. | % | | |
| Browsing by titles | 97 | 63.8 | 34 | 22.4 | 10 | 6.6 | 6 | 3.9 | 5 | 3.3 | 668 | 21.67 |
| Browsing by subjects | 89 | 58.6 | 32 | 21.1 | 16 | 10.5 | 8 | 5.3 | 7 | 4.6 | 644 | 20.89 |
| Browsing by authors' names | 68 | 44.7 | 52 | 34.2 | 17 | 11.2 | 9 | 5.9 | 6 | 3.9 | 623 | 20.21 |
| Browsing by thumbnails | 41 | 27 | 34 | 22.4 | 36 | 23.7 | 19 | 12.5 | 22 | 14.5 | 509 | 16.51 |
| Search engine of entire data | 96 | 63.2 | 21 | 13.8 | 17 | 11.2 | 6 | 3.9 | 12 | 7.9 | 639 | 20.72 |
| Total | | | | | | | | | | | 3083 | 100 |

Respondents were asked to rate (Like best, Like, Neutral, Do not like very much, and Do not like at all) their preferred methods for retrieval and navigation of Arabic manuscript collections via a digital library. Table 6-17 shows the preferred methods stated by respondents. The most popular method was navigation by title (score=668, μ=21.67). The second most popular method was browsing of Arabic manuscripts by subject (score=644, μ=20.89). Using a search engine to browse the complete bibliographic data of Arabic manuscripts (e.g. search by keywords: title, author, date, copyist, and so on) was the third most popular method (score=639, μ=20.72), followed by browsing by authors' names (score=623, μ=20.21). Browsing by Arabic manuscript thumbnails as a method for retrieving Arabic manuscripts was the least preferred method (score=509, μ=16.51).

Navigation of Arabic manuscript collections by predefined entries (e.g. title, subject, and/or authors' names) was the most popular method in libraries' printed-

catalogues and bibliographies which have ordered their entries by title and classified their contents by subject or theme (e.g. chronological or geographical order). This appears to suggest that traditional paper-based filing systems continue to be prevalent in the study of the humanities.

### 6.6.4 Digital Library Interface and Services

**Table 6-18: Digital Library Service and Interface**

| Answer / Variable | Very important | | Important | | No preference | | Less important | | Not important | | Score | Weighted Mean (μ) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % | No. | % | | |
| Ability to zoom in/out of images in Arabic manuscripts | 108 | 71.1 | 23 | 15.1 | 7 | 4.6 | 9 | 5.9 | 5 | 3.3 | 676 | 14.31 |
| Ability to download/save images of Arabic manuscripts | 72 | 47.4 | 40 | 26.3 | 14 | 9.2 | 10 | 6.6 | 16 | 10.5 | 598 | 12.66 |
| Ability to print out images of Arabic manuscripts | 101 | 66.4 | 24 | 15.8 | 13 | 8.6 | 7 | 4.6 | 7 | 4.6 | 661 | 13.99 |
| Ability to share images of Arabic manuscripts via social networking | 44 | 28.9 | 32 | 21.1 | 38 | 25 | 18 | 11.8 | 20 | 13.2 | 518 | 10.97 |
| Ability to compare more than one image side-by-side in the browser | 67 | 44.1 | 37 | 24.3 | 22 | 14.5 | 10 | 6.6 | 16 | 10.5 | 585 | 12.38 |
| Ability to insert comments on Arabic manuscripts images | 43 | 28.3 | 41 | 27 | 27 | 17.8 | 20 | 13.2 | 21 | 13.8 | 521 | 11.03 |
| Ability to browse and search the references | 78 | 51.3 | 34 | 22.4 | 19 | 12.5 | 11 | 7.2 | 10 | 6.6 | 615 | 13.02 |
| Total | | | | | | | | | | | 4724 | 100 |

Respondents were asked to rank visualisation and personalisation services (Very important to Not important, on a five-point Likert-type scale) that can be provided via a digital library. The service in greatest demand was zooming in/out of Arabic manuscript images (score=676, μ=14.32). The second most required service was printing out Arabic manuscript images (score=661, μ=13.99). Downloading and saving Arabic manuscript images was the third required service (score=598, μ=12.66). Katifori, A. et al. (2008) state that: "*...downloading and saving are very common methods for storing primary sources, since historians want to have access to them independently of the web*

*accessibility*". Integration of knowledge and cross-linking related references via the ability to search for and browse research references (e.g. bibliographies, dictionaries, atlases, etc.) was the fourth most required service (score=615, μ=13.02). The service deemed least important (score=518, μ=10.97) was sharing Arabic manuscript images via social networks (e.g. CiteULike, Facebook, Delicious, etc.).

### 6.6.5 Integration of Knowledge

**Table 6-19: Preferred Resources**

| Answer / Variable | Very important | | Important | | No preference | | Less important | | Not important | | Score | Weighted Mean (μ) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % | No. | % | | |
| Bibliographies of Arabic manuscripts | 88 | 57.9 | 30 | 19.7 | 17 | 11.2 | 8 | 5.3 | 9 | 5.9 | 636 | 10.46 |
| Catalogues of Arabic manuscripts | 118 | 77.6 | 14 | 9.2 | 12 | 7.9 | 2 | 1.3 | 6 | 3.9 | 692 | 11.38 |
| Dictionaries and glossaries | 66 | 43.4 | 41 | 27 | 25 | 16.4 | 11 | 7.2 | 9 | 5.9 | 600 | 9.87 |
| Biographies | 70 | 46.1 | 41 | 27 | 27 | 17.8 | 8 | 5.3 | 6 | 3.9 | 617 | 10.15 |
| Directories of theses and dissertations | 72 | 47.4 | 39 | 25.7 | 18 | 11.8 | 8 | 5.3 | 15 | 9.9 | 601 | 9.88 |
| Atlases | 55 | 36.2 | 40 | 26.3 | 28 | 18.4 | 15 | 9.9 | 14 | 9.2 | 563 | 9.26 |
| Journals of Arabic manuscript | 76 | 50 | 34 | 22.4 | 24 | 15.8 | 9 | 5.9 | 9 | 5.9 | 615 | 10.12 |
| Arabic manuscript text-books | 55 | 36.2 | 39 | 25.7 | 24 | 15.8 | 15 | 9.9 | 19 | 12.5 | 552 | 9.08 |
| Total | | | | | | | | | | | 6080 | 100 |

Respondents were asked to rank (Most important to Not important) the information source that they consider to be most useful alongside Arabic manuscripts in a digital library. Many libraries tend to print out their Arabic manuscripts catalogues in book form. These printed Arabic manuscript catalogues are one of the main information resources in a real-world environment. In fact, in a virtual environment (i.e. digital

libraries), this seems to be an important and required resource as well. The majority of respondents ranked Arabic manuscript catalogues as the most frequently-required information resource (score=692, $\mu$=11.38) via the digital library. These catalogues can be in scanned form, or can be provided via federated search engines of other libraries' OPACs, which were illustrated in Table 6-16: Digital Library Functions as being considered by respondents to be the most important function of a digital library of Arabic manuscripts. Arabic manuscript bibliographies were the second most required resource (score=636, $\mu$=10.46). These first two resources serve the purpose of locating Arabic manuscripts. Biographies were the third most required resource (score=617, $\mu$=10.15), followed by journals related to Arabic manuscripts, which were ranked as the fourth most required resource (score=615, $\mu$=10.12). The least important resources were Arabic manuscript text-books (score=552, $\mu$=9.08).

Participants were asked to provide suggestions for materials that could be contained within a digital library of Arabic manuscripts in Q21. Five respondents made reference to online databases (e.g. Index Islamicus). This database is provided by Brill Publisher and its use is chargeable. Application of an external link feature to such useful resources and materials may be beneficial.

### 6.6.6 Participants' Comments

Participants were invited to offer comments, notes, and/or recommendations in Q22. A summary of comments received are as follows:

Arabic manuscripts' providers should cooperate in providing sustainable access to their collection via recent technology (i.e. the internet).

Using a content management system to manage Arabic manuscripts via the internet.

Arabic manuscripts that are going to be available online should be secured.

Not all Arabic manuscripts should be available online to public; the availability should be controlled.

## 6.7 Further Data Analysis

This section presents Arabic manuscript providers (i.e. librarians) and end-user requirements through analysis of the questionnaires. As stated in Research Methodology

chapter (see page 4.3.3.3), librarians who work in Arabic manuscript departments at the selected libraries participated in the questionnaire. These librarians work either as department directors, cataloguers/indexers, or information service providers, in Arabic manuscript departments at the ten surveyed provider sites (Chapter Two: see page 67). The responses by librarians may represent the providers' perspectives for providing Arabic manuscripts via a digital library. Therefore, this may be valuable to determine whether there is any discrepancy between end-users and providers with regard to preferred digital library functions, retrieval requirements, and interface and service requirements. A mean score was utilised to compare means among participants' preferences. The Mann-Whitney U test for non-parametric data was applied, as discussed in Chapter Four (see page 150).

### 6.7.1 Arabic Manuscript Providers Vs. End-user Requirements

**Table 6-20: Participants' Categories**

| Participants | | Number | Percentage |
|---|---|---|---|
| | Librarians | 31 | 18 |
| | End-users | 144 | 82 |
| | Total | 175 | 100 |

Thirty-one librarians participated in the questionnaire (18%). The remainder of the total participants (175) were end-users (n=144, 82%), as shown in Table 6-20.

### 6.7.2 Digital Library Function

Participants in the questionnaire were asked to rank the importance (Very important is coded in SPSS as 1, Not important is coded in SPSS as 5) of the following

digital library functions: accessing resources, locating resources, integration of knowledge, and creation of knowledge by integrated e-forum, blog, and/or wikis. Table 6-16: Digital Library Functions shows that the location of resources is the most important function for the respondents. The second most important function is access to knowledge by providing Arabic manuscript images. Integration of knowledge by providing researchers' references was considered to be the third most important function.
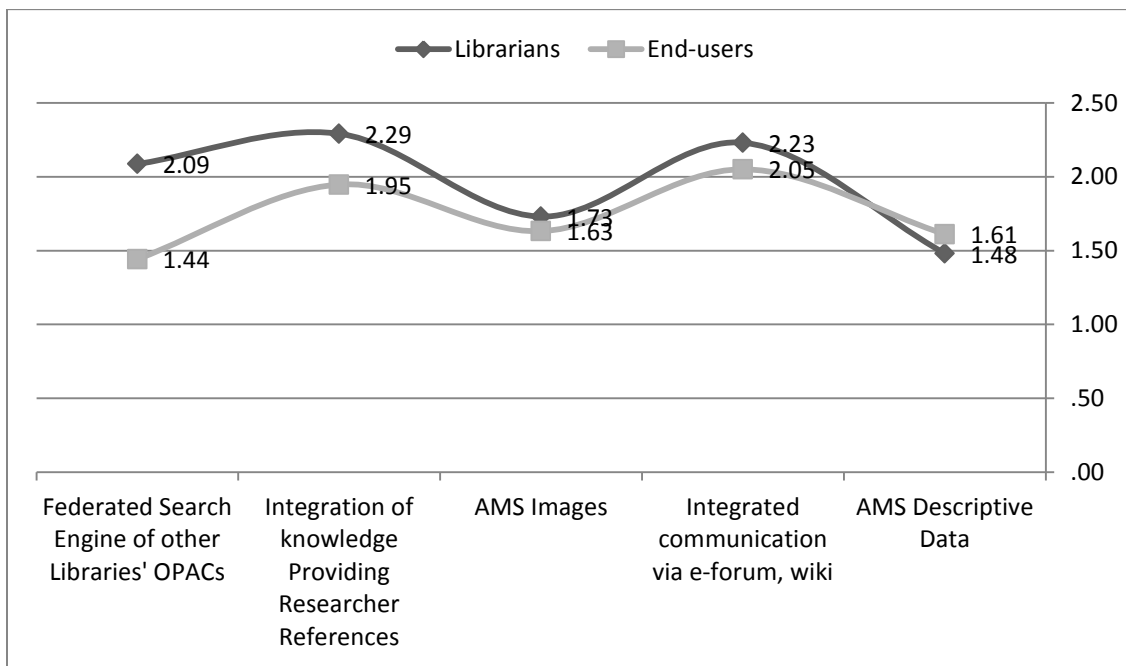


**Figure 6-2: Mean scores of Digital Library Functions**

By comparing the mean scores of the two participant groups (i.e. librarians and end-users), Figure 6-2: Mean scores of Digital Library Functions illustrates that librarians are more interested in a location function (AMS Descriptive Data) than end-users (means: 1.48 and 1.61, respectively). However, providing an ability to search other libraries'

OPACs for locating resources outside the digital library collection is more important for end-users than librarians. Access to resources through providing Arabic manuscript images is rated more closely between the two groups (librarians' mean: 1.73, and end-users' mean: 1.63).

The following table demonstrates the ratings of importance of the two independent groups (i.e. librarians and end-users) for the digital library functions.

**Table 6-21: Mann-Whitney U Test for Digital Library Functions**

| | Respondent Type | N | Mean Rank | Sum of Ranks | Mann-Whitney U | @ 0.05 |
|---|---|---|---|---|---|---|
| **AMS Descriptive Data** | Librarians | 27 | 67.50 | 1822.50 | 1444.500 | 0.236 |
| | End-users | 121 | 76.06 | 9203.50 | | |
| | Total | 148 | | | | |
| **AMS Images** | Librarians | 26 | 76.75 | 1995.50 | 1605.500 | 0.916 |
| | End-users | 125 | 75.84 | 9480.50 | | |
| | Total | 151 | | | | |
| **Researcher References** | Librarians | 24 | 76.23 | 1829.50 | 1230.500 | 0.377 |
| | End-users | 115 | 68.70 | 7900.50 | | |
| | Total | 139 | | | | |
| **Federated Search Engine of other Libraries' OPACs** | Librarians | 23 | 90.17 | 2074.00 | 1008.000 | **0.008** |
| | End-users | 122 | 69.76 | 8511.00 | | |
| | Total | 145 | | | | |
| **Integrated communication via e-forum, blog, or wiki** | Librarians | 26 | 78.56 | 2042.50 | 1376.500 | 0.384 |
| | End-users | 118 | 71.17 | 8397.50 | | |
| | Total | 144 | | | | |

## Hypothesis Test Summary

| | Null Hypothesis | Test | Sig. | Decision |
|---|---|---|---|---|
| 1 | The distribution of Federated Search Engine of other Libraries' OPACs is the same across categories of Respondent Type. | Independent-Samples Mann-Whitney U Test | .008 | Reject the null hypothesis. |

Asymptotic significances are displayed. The significance level is .05.

The Mann-Whitney U test (Table 6-21) shows that there is no significant difference between the responses of the two studied groups, except for regarding provision of a federated search engine of other libraries' OPACs, which shows a significant statistical disparity.

**Table 6-22: Ranking Federated Search Engine by End-users and Librarians**

| Function | | | 1 | 2 | 3 | 4 | 5 | Total |
|---|---|---|---|---|---|---|---|---|
| **Federated Search Engine of other Libraries' OPACs** | Librarian | Count | 11 | 6 | 1 | 3 | 2 | 23 |
| | | % within Respondent Type | 47.8% | 26.1% | 4.3% | 13.0% | 8.7% | 100.0% |
| | | % of Total | 7.6% | 4.1% | .7% | 2.1% | 1.4% | 15.9% |
| | End-user | Count | 90 | 19 | 7 | 3 | 3 | 122 |
| | | % within Respondent Type | 73.8% | 15.6% | 5.7% | 2.5% | 2.5% | 100.0% |
| | | % of Total | 62.1% | 13.1% | 4.8% | 2.1% | 2.1% | 84.1% |
| **Total** | | Count | 101 | 25 | 8 | 6 | 5 | 145 |

As demonstrated in Table 6-22, the majority of end-users (73.8%) rated this function as very important (=1), while 47.8% of librarians rated providing a federated search engine as very important (=2). This difference might be as a result of librarians

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being more aware of problems and issues regarding this function, such as the lack of bibliographic control tools (subject headings, classification schemes, and authority file names) (Al-Showaish, 2000; Nasr, 2007).

### 6.7.3 Arabic Manuscript Retrieval Requirements via a Digital Library

As demonstrated in Table 6-17: Preferred Retrieval Methods, respondents ranked their preferred methods of retrieving and navigating Arabic manuscripts via a digital library in the following order: by title, then search engine or keyword search, and then by subject.
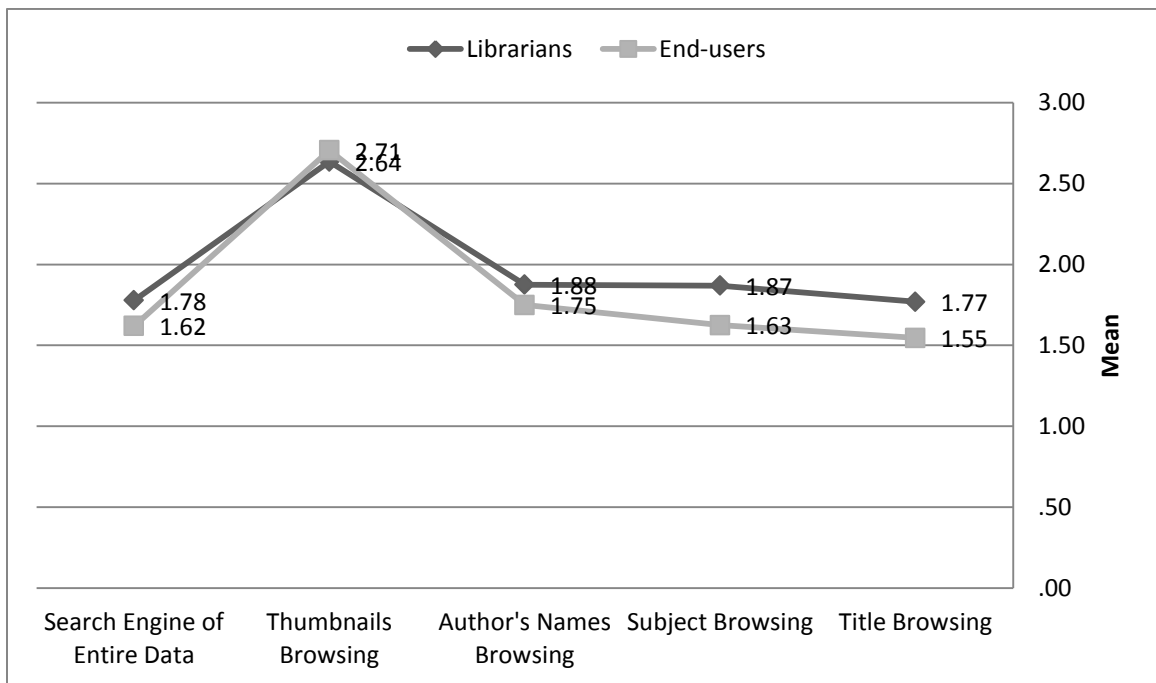


**Figure 6-3: Mean Scores of Preferred Retrieval Methods**

Figure 6-3 shows that there is no difference between the responses of the two groups. Both groups indicated that browsing by Arabic manuscripts' thumbnails was their least preferred method of retrieval.

**Table 6-23: Mann-Whitney U Test for Prefered Retrieval Methods**

|  | Respondent Type | N | Mean Rank | Sum of Ranks | **Mann-Whitney U** | **@ 0.05** |
|---|---|---|---|---|---|---|
| **Browsing by Title** | Librarians | 26 | 80.98 | 2105.50 | 1625.500 | 0.721 |
|  | End-users | 130 | 78.00 | 10140.50 |  |  |
|  | Total | 156 |  |  |  |  |
| **Browsing by Author's Name** | Librarians | 24 | 76.46 | 1835.00 | 1441.000 | 0 .794 |
|  | End-users | 124 | 74.12 | 9191.00 |  |  |
|  | Total | 148 |  |  |  |  |
| **Browsing by Subject** | Librarians | 23 | 83.48 | 1920.00 | 1300.000 | 0 .309 |
|  | End-users | 128 | 74.66 | 9556.00 |  |  |
|  | Total | 151 |  |  |  |  |
| **Browsing by Thumbnails** | Librarians | 22 | 69.20 | 1522.50 | 1269.500 | 0 .823 |
|  | End-users | 119 | 71.33 | 8488.50 |  |  |
|  | Total | 141 |  |  |  |  |
| **Integrated OPAC** | Librarians | 27 | 76.94 | 2077.50 | 1567.500 | 0 .692 |
|  | End-users | 121 | 73.95 | 8948.50 |  |  |
|  | Total | 148 |  |  |  |  |

As shown by the Mann-Whitney U test (Table 6-23), there is not a significant statistical difference between the two groups with regard to rating preferred methods of retrieving and navigating resources via a digital library of Arabic manuscripts.

**6.7.4 Digital Library Interface and Services Requirements**

Respondents rated provided services (Very important to Not important) as shown in Table 6-18: Digital Library Service and Interface. Zooming in/out of manuscript images was rated as the most important service that should be provided. The second most important service stated was the ability to obtain a hard copy of a manuscript by providing the facility to print documents. A saving and downloading service was the third most important service stated.
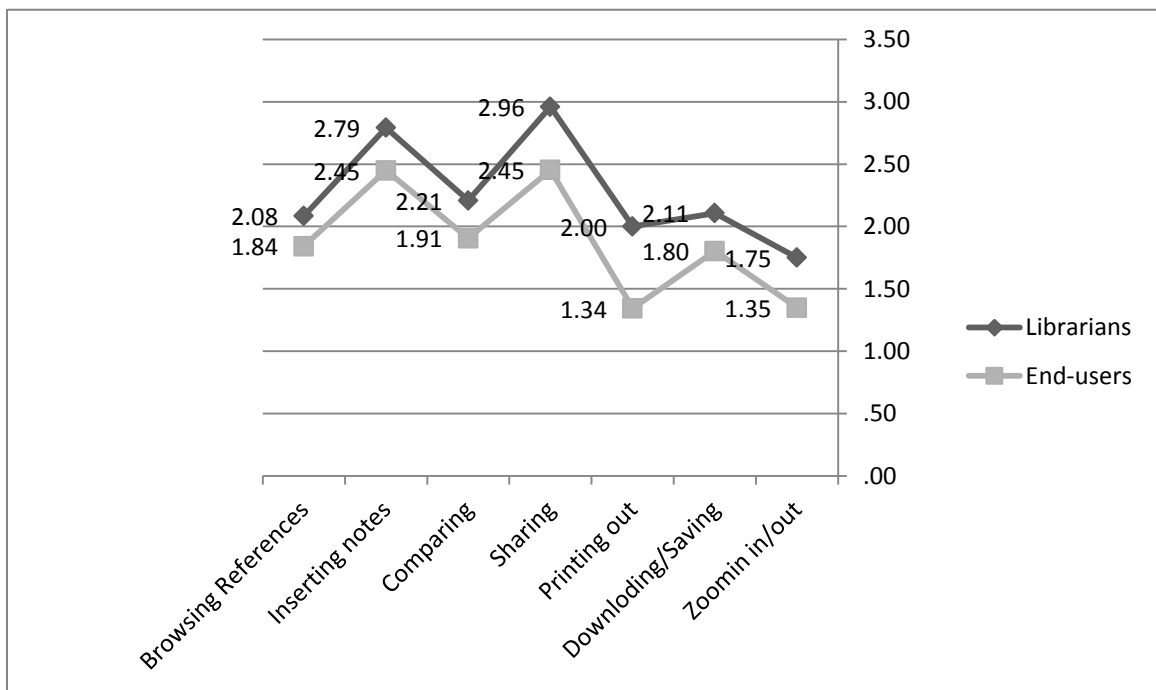


**Figure 6-4: Mean Scores of Digital Library Interface and Service**

Figure 6-4 presents the mean scores of the two groups in terms of the importance of services that should be available in a digital library of Arabic manuscripts. Overall, the listed services are close in mean scores between the two groups, apart from the printing service.

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**Table 6-24: Mann-Whitney U Test of Digital library Interface and Service**

| | Respondent Type | N | Mean Rank | Sum of Ranks | Mann-Whitney U | @ 0.05 |
|---|---|---|---|---|---|---|
| **Zooming In/Out** | Librarians | 28 | 88.48 | 2477.50 | 1456.500 | 0 .052 |
| | End-users | 126 | 75.06 | 9457.50 | | |
| | Total | 154 | | | | |
| **Downloading/Saving** | Librarians | 28 | 85.61 | 2397.00 | 1285.000 | 0.052 |
| | End-users | 117 | 69.98 | 8188.00 | | |
| | Total | 145 | | | | |
| **Printing** | Librarians | 24 | 92.63 | 2223.00 | 1005.000 | 0.001 |
| | End-users | 122 | 69.74 | 8508.00 | | |
| | Total | 146 | | | | |
| **Sharing** | Librarians | 25 | 85.08 | 2127.00 | 1123.000 | 0.058 |
| | End-users | 117 | 68.60 | 8026.00 | | |
| | Total | 142 | | | | |
| **Comparing** | Librarians | 24 | 82.31 | 1975.50 | 1132.500 | 0.104 |
| | End-users | 117 | 68.68 | 8035.50 | | |
| | Total | 141 | | | | |
| **Inserting notes** | Librarians | 24 | 76.75 | 1842.00 | 1290.000 | 0.482 |
| | End-users | 118 | 70.43 | 8311.00 | | |
| | Total | 142 | | | | |
| **Browsing references** | Librarians | 24 | 77.40 | 1857.50 | 1322.500 | 0.499 |
| | End-users | 120 | 71.52 | 8582.50 | | |
| | Total | 144 | | | | |
| | End-users | 117 | 65.89 | 7709.00 | | |
| | Total | 139 | | | | |

**Hypothesis Test Summary**

| | Null Hypothesis | Test | Sig. | Decision |
|---|---|---|---|---|
| 1 | The distribution of Printing out is the same across categories of Respondent Type. | Independent-Samples Mann-Whitney U Test | .001 | Reject the null hypothesis. |

Asymptotic significances are displayed. The significance level is .05.

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As shown in the Mann-Whitney U test (Table 6-24), there are no significant discrepancies between the two groups (librarians and end-users) when ranking these services from Very important to Not important. However, printing Arabic manuscript images is the most important service from the end-users' perspective (n=97, 79.5%), while only half of the librarians (n=12, 50%) ranked this service as most important, as shown in Table 6-25: Ranking Printing Service By End-users and Librarians. The high importance of printing, downloading, and saving Arabic manuscript images may attributable to the fact that end-users wish to obtain a hard copy of their source: "…downloading and saving are very common methods for storing primary sources, since historians want to have access to them independently of the web accessibility" (Mergoupi-Savaidou, E. et al, 2008). Alternatively, it could be that the "paper document" is still a preferable medium for reading as a main task for end-users (Crane, 2002). As result of end-user behaviour, "…the traditional "paper document" metaphor is still felt as prevailing in DL environments" (Kimani, S. et al. 2006).

**Table 6-25: Ranking Printing Service By End-users and Librarians**

| Service | | | 1 | 2 | 3 | 4 | 5 | Total |
|---|---|---|---|---|---|---|---|---|
| **Printing** | Librarians | Count | 12 | 5 | 3 | 1 | 2 | 23 |
| | | % within Respondent Type | 50.0% | 20.8% | 16.7% | 4.2% | 8.3% | 100.0% |
| | | % of Total | 8.2% | 3.4% | 2.7% | .7% | 1.4% | 16.4% |
| | End-users | Count | 97 | 15 | 5 | 3 | 2 | 122 |
| | | % within Respondent Type | 79.5% | 12.3% | 4.1% | 2.5% | 1.6% | 100.0% |
| | | % of Total | 66.4% | 10.3% | 3.4% | 2.1% | 1.4% | 83.6% |
| **Total** | | Count | 109 | 20 | 9 | 4 | 4 | 146 |
| | | % within Respondent Type | 74.7% | 13.7% | 6.2% | 2.7% | 2.7% | 100.0% |
| | | % of Total | 74.7% | 13.7% | 6.2% | 2.7% | 2.7% | 100.0% |

**6.7.5 Integration of Knowledge**

Several secondary and tertiary resources were rated by participants according to the importance (Most important=1, Not important=5) of their integration into a digital library. Printed catalogues and bibliographies of Arabic manuscripts were the most important resources. Biographies and thesis and dissertation directories were ranked in second place.
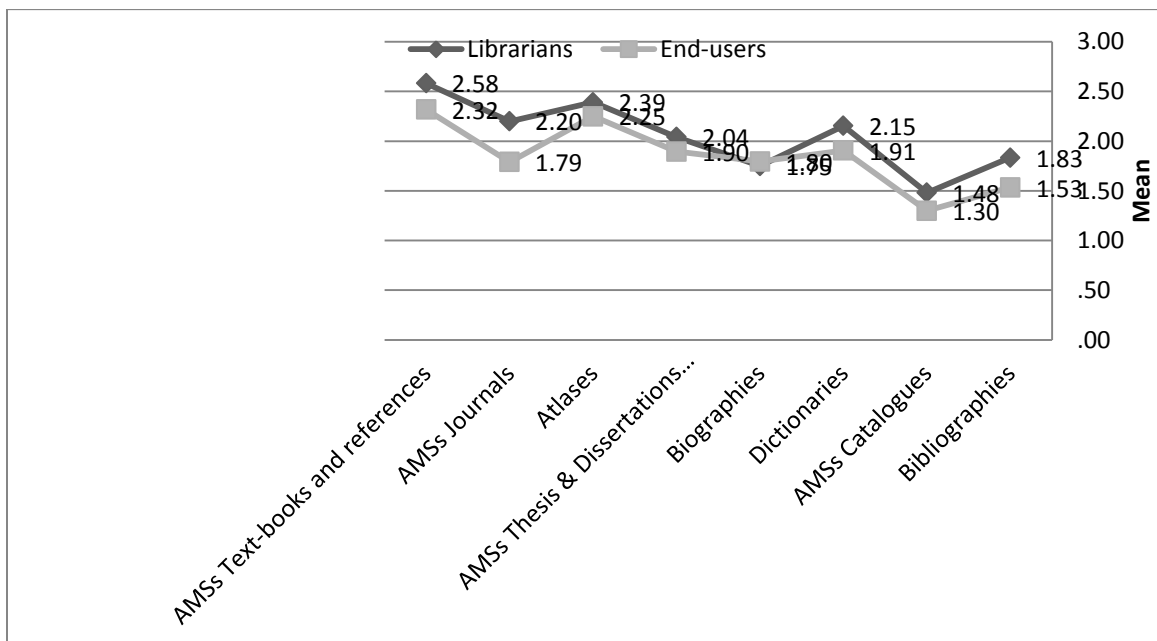


**Figure 6-5: Mean Scores of Integration of Knowledge.**

Mean scores of librarian and end-user responses are shown in Figure 6-5. Arabic manuscript printed catalogues are the most important resource as rated by the two groups (librarians' mean: 1.48, end-users' mean: 1.30). It is notable that the least important resource to the two groups is the integration of Arabic manuscript text-books and references.

**Table 6-26: Mann-Whitney U Test of Integration of Knowledge**

| | Respondent Type | N | Mean Rank | Sum of Ranks | Mann-Whitney U | @0.05 |
|---|---|---|---|---|---|---|
| **AMS Catalogues** | Librarians | 27 | 79.50 | 2146.50 | 1660.500 | 0.694 |
| | End-users | 127 | 77.07 | 9788.50 | | |
| | Total | 154 | | | | |
| **Bibliographies** | Librarians | 24 | 76.79 | 1843.00 | 1241.000 | 0.315 |
| | End-users | 116 | 69.20 | 8027.00 | | |
| | Total | 140 | | | | |
| **Dictionaries** | Librarians | 26 | 80.15 | 2084.00 | 1335.000 | 0.268 |
| | End-users | 118 | 70.81 | 8356.00 | | |
| | Total | 144 | | | | |
| **Biographies** | Librarians | 24 | 72.13 | 1731.00 | 1431.000 | 0.850 |
| | End-users | 122 | 73.77 | 9000.00 | | |
| | Total | 146 | | | | |
| **AMS Thesis & Dissertations** | Librarians | 24 | 81.50 | 1956.00 | 1320.000 | 0.342 |
| | End-users | 124 | 73.15 | 9070.00 | | |
| | Total | 148 | | | | |
| **Atlases** | Librarians | 23 | 76.87 | 1768.00 | 1268.000 | 0.522 |
| | End-users | 120 | 71.07 | 8528.00 | | |
| | Total | 143 | | | | |
| **AMS Journals** | Librarians | 25 | 87.44 | 2186.00 | 1239.000 | 0.085 |
| | End-users | 124 | 72.49 | 8989.00 | | |
| | Total | 149 | | | | |
| **AMS Text-books and Reference** | Librarians | 24 | 78.29 | 1879.00 | 1277.000 | 0.397 |
| | End-users | 119 | 70.73 | 8417.00 | | |
| | Total | 143 | | | | |

The Mann-Whitney U test (Table 6-26) shows no statistical significance between the two groups - librarians and end-users - in rating the importance of integrated secondary and tertiary resources in a digital library of Arabic manuscripts.

## 6.8 Summary

This chapter has presented the results of the paper- and web-based questionnaire. The total number of valid questionnaires analysed was 175, of which 68 (38.9%) were paper-based, and 107 (61.1%) were online-based. The majority of participants in the survey were men (n=141, 80.6%). Almost half of the respondents were aged between 31 and 43. 53 PhD holders participated in the survey, along with 48 Masters Degree holders. Participants employed as university staff members were the most numerous in the survey (54), followed by postgraduate students (46). Independent researchers comprised the third most numerous group of participants in the survey (44).

The length of experience with Arabic manuscripts by participants was varied; however, fifty-seven participants reported that they had more than six years of experience dealing with Arabic manuscripts, and forty-one respondents reported that they had less than a year of experience.

The greatest number of participants rated their ICT skills as excellent and very good (46 and 62, respectively). Three respondents rated their ICT skills as weak. Approximately 80% of participants reported that their Internet usage is on a daily basis. Only three participants reported that they never use the internet. When participants were asked to state whether they use the internet for doing scientific research, the majority answered in the affirmative (n=152, 86.9%). The observed data of respondents' characteristics display a positive association between a higher level of education and greater internet use (e.g. PhD holders: 92.6% vs. Bachelor holders: 83.9%). Experienced

users of Arabic manuscripts (86%) tended to use the internet to a lesser extent than the most junior users (87.8%).

The internet resources deemed by participants to be most reliable were library, museum, and archive websites, and digital libraries. E-forums were the second most reliable internet resource as rated by respondents.

Searching for Arabic manuscripts via the internet was reported by participants. The majority of participants (n=120) had used the internet to search for Arabic manuscripts. However, thirty-two participants reported that they had not used the internet for this purpose. Ninety-two respondents reported that they had searched for Arabic manuscript images via the Internet. The most frequently-used website reported by participants was Multaqa Ahl Alhadeeth (e-forum) (n=89, 51%). The Online Public Access Catalogue by the King Faisal Centre for Research and Islamic Studies was the second most reported website. The Digital Library of King Saud University (Makhtota) was the sixth most reported website by participants (n=60, 34%).

84.2% of participants reported that they had used the internet for research and considered this to be an important research tool. A digitised Arabic manuscript was the most frequently-preferred medium (score=664, $\mu$=39.59) as a surrogate of the original. The least frequently-preferred surrogate was Arabic manuscripts on microforms (score=425, $\mu$=25.34).

The most desirable functional requirement of a digital library by participants was location of Arabic manuscripts by providing descriptive metadata and facilitating federated search engines of other libraries' OPACs ($\mu=17.68$, and $\mu=17.65$ respectively).

Participants were asked to rate the importance of a list of services and interface functions in a digital library of Arabic manuscripts. The most frequently-demanded service by participants was provision of the facility to zoom in/out of Arabic manuscript images (score=676, $\mu=14.32$). Secondly, respondents required the ability to obtain a hard copy of the manuscript via a printing out facility (score=661, $\mu=13.99$). The least frequently-demanded service by participants was sharing facilities via web 2.0 applications (score=518, $\mu=10.97$).

The most desirable resource that could be integrated into a digital library of Arabic manuscripts is availability of other libraries' catalogues of Arabic manuscripts (score=692, $\mu=11.38$). Bibliographies of Arabic manuscripts were the second and third most-demanded resources (score=636, $\mu=10.46$).

The present study aims to specify users' requirements and two groups (i.e. end-users and librarians) have participated in the study. Therefore, further analysis has been conducted to determine whether there is a contrast in preferences between the two groups. The Mann-Whitney U test for non-parametric data was applied. The results of this test presented a significant statistical disparity between the two groups regarding preferences for both provision of a federated search engine of other libraries' OPACs, and a facility to print out Arabic manuscripts, as digital library services.

# CHAPTER SEVEN FINDINGS,

# RECOMMENDATIONS, AND

# CONCLUSION

## 7.1 Introduction

After presenting the history of Arabic manuscripts along with their characteristics and importance, and giving some examples of digital libraries of Arabic manuscripts (Chapter Three), thus achieving the first research objective (i.e., To examine and evaluate the efforts of some current digital library holders of Arabic manuscripts globally and locally) followed by a presentation of data analysis (Chapters Five and Six), this chapter presents the findings of the research on specifying users' requirements to provide best practice for a digital library of Arabic manuscripts in the KSA. Thus, the second research objective (i.e., To identify and investigate the requirements of providers and users of Arabic manuscripts in the KSA) is achieved. Some recommendations for establishing such a digital library are also presented in this chapter. These recommendations are the result of the study data analysis and of the analysis of previous researches and studies, also addressed in this study.

## 7.2 Findings

Throughout the presentation of data analysis and discussions (in Chapters Two, Three, Five and Six) are findings that answer research questions, as demonstrated in the following table (Table 7-1):

**Table 7-1: The Research Questions and Findings**

| Q | About | Findings | Chapter No. |
|---|---|---|---|
| 1 | Digital libraries of Arabic manuscripts in some western countries. | A number of digital libraries display Arabic manuscripts, e.g. IHP, WDL and Wellcome Arabic Manuscripts Online. | Chapter Three |
| 2 | Digital libraries of Arabic manuscripts with the KSA as the selected place of the study. | Two such digital libraries already exist (the KAAUL Digital Library: Manuscripts and Makhtota; Manuscript by PSL) | Chapter Three |
| 3 | Characteristics and attributes of Arabic manuscripts. | Physical and intellectual aspects of Arabic manuscripts. | Chapter Two |
| 4 | Expected benefits of digital libraries of Arabic manuscripts. | Easy, fast, costs less, materials can be preserved for a long time, etc. | Chapter Three |
| 5 | Challenges and issues in establishing a digital library of Arabic manuscripts in the KSA. | Rules and regulations on using Arabic manuscripts, security issues, lack of organisational tools, e.g. cataloguing rules and standards, authority files, etc. | Chapters Two and Five |
| 6 | End user's academic requirements from the digital libraries of Arabic manuscripts in the KSA. | Online access to primary and secondary resources, ability to cross-search library's OPACs, obtaining previews and downloads of Arabic manuscripts, and hardcopies of manuscripts, etc. | Chapters Five and Six |

| 7 | Provider' academic requirements from the digital libraries of Arabic manuscripts in the KSA. | Content management system, usage policy of a digital library, visualisation and service requirements, e.g. supporting profiles for users, zooming in/out of images, etc. | Chapters Five and Six |
|---|---|---|---|
| 8 | Providers' vs. end users' requirements. | Locating resources across various libraries' OPACs and obtaining a hardcopy of a manuscript attracts the end users. | Chapter Six |

A number of findings in the data analysis and discussions conducted in the previous chapters met the research objectives. Objective (i.e., To identify and investigate the requirements of providers and users of Arabic manuscripts in the KSA) is achieved and presented in Chapters Five and Six.

The third research objective (i.e., To provide guidelines for best practice for the implementation of a digital library of Arabic manuscripts) has also been achieved as, the research findings, together with the analysis of previous researches and studies, also addressed in this study, permitted the researcher in developing guidelines for the implementation of a digital library of Arabic manuscripts. These guidelines are presented in this chapter in the form of recommendations for establishing such a digital library. Thus, it can be concluded that all three research objectives have been fulfilled. Findings are presented and categorised in the following summary.

**7.2.1 Intellectual and Physical Characteristics of Arabic Manuscripts**

Arabic manuscripts have some unique characteristics that make them valuable when acquired, organised and disseminated by libraries, museums and archives centres. These characteristics can be classified into two themes: physical and contextual. The physical themes, such as illuminations, illustrations, gilding, calligraphy, etc., can be observed. In terms of contextual characteristics, although Arabic manuscripts contain valuable knowledge from many scholarly fields, they need to be exposed and published for the public. Hence, a cultural heritage revival movement has been initiated to reproduce this inscribed heritage in commonly-used forms such as books. Many universities have taken up this movement to standardise and contribute by providing academic courses in editing Arabic manuscripts and awarding academic degrees, thus facilitating access to Arabic manuscripts. A number of universities in the KSA are contributing as academic bodies by taking up this responsibility for facilitating access and awarding academic degrees.

**7.2.2 Current Digital Libraries of Arabic Manuscripts in Light of the Study Findings**

This study has examined digital library functions, retrieval methods, and services by participants (on page 219). Table 7-2: Evaluation of Current DLs of AMSs in Light of the Study Findings presents the evaluation of the sample of digital libraries that were presented in Chapter Four (on page 85) which the author developed in the light of the study findings concerning users' requirements of digital libraries in terms of functions, retrieval methods, and services (see p.219). According to Saracevic and Kantor (1997),

Kyrillidou (1998), Monopoli (2002), and Lesk (2005), the most appropriate basis for the evaluation of libraries. This evaluation was therefore carried out by the researcher on this basis, by the simple but effective method of accessing digital libraries and checking which of the requirements expressed by the users they fulfilled.

**Table 7-2: Evaluation of Current DLs of AMSs in Light of the Study Findings**

| Name | Digital Library Function | | | | | Retrieval, Browsing Methods | | | | | Digital Library Services and Interface | | | | | | | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AMS Images | AMS Metadata | Federated Search Engine | Integration of Resources | Integrated Communication | Browsing by Title | Browsing by Author's Name | Browsing by Subject | Browsing by Thumbnails | Search Engine of Entire Data | Zooming in/out | Downloading/ Saving | Printing out | Sharing | Comparing | Inserting notes | Browsing References | |
| Islamic Medical Manuscripts at the NLM | NO. Sample of images only | YES | NO | NO | NO | YES | YES | YES | YES | NO | NO | NO | NO | NO | NO | NO | NO | |
| Islamic Heritage Project (IHP) | YES | YES | NO | NO | NO | YES | YES | YES | NO | YES. via the Library OPAC | YES | YES | YES | NO | NO | NO | NO | Saving/ Downloading/ Printing under 10 pages immediately. Over10 pages sent by email. |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| World Digital Library (WDL) | YES | YES | NO | NO | NO | YES | NO | YES | YES | YES | YES | YES | YES | YES. social networking | NO | NO | NO |
| Wellcome Arabic Manuscripts Online | YES | YES | NO | NO | NO | NO | NO | NO | NO | YES | YES | YES | YES | YES | YES | NO | NO |
| Digitised Arabic Manuscripts at the AUB Libraries | NO. Partial previewing | YES | NO | NO | NO | YES | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Manuscript (Makhtota) Digital Library of Arabic Manuscript in PSL | YES | YES | NO | NO | NO | NO | NO | NO | NO | YES | NO | YES | YES | NO | NO | YES. Recently added | NO | Saving/Downloading/ printing is by individual page |
| Digital Library at KAAUL: Manuscripts | YES. Partial previewing | YES. Short descriptions | NO | NO | NO | NO | NO | YES | NO | NO | NO | YES | YES | NO | NO | NO | NO | Saving/Downloading/ printing is limited |

*Digital Library Functions:*

As demonstrated in Table 7-2, the most commonly available functions are providing access to the digital library collection via providing Arabic manuscript images, and providing Arabic manuscript metadata. However, the remaining three functions are non-existent in the digital library sample. It is worth mentioning that IHP has been linked to the Harvard University OPAC library system (HOLLIS), which allows the user to search the library's entire collection. However, the library system does not support a federated search engine for other libraries that hold Arabic manuscripts.

*Retrieval and Browsing Methods:*

Four digital libraries provide the ability to browse their collections by title. In addition, four digital libraries provide the ability to search the entire Arabic manuscript metadata by providing a search engine. It is notable that Islamic Medical Manuscripts at the NLM, IHP, and WDL provide four out of five of the listed retrieval and browsing methods. In contrast, the remaining digital libraries provide just one method for retrieving and browsing their collections.

*Digital Library Services and Interface:*

The facility to zoom in/out of Arabic manuscripts is provided by three digital libraries (i.e. IHP, WDL, and Wellcome Arabic Manuscripts Online). This facility is supported by zooming internet software. The four remaining digital libraries do not support zooming features for their collection. Downloading, saving, and printing facilities are provided in five digital libraries. IHP provides these services, but in a limited manner. Ten pages or fewer can be downloaded in PDF format immediately. However, downloading more than ten pages is done by submitting an online request, and these are then emailed to the user. The two digital libraries in the KSA provide

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the ability to download a manuscript, but this is also limited. Wellcome Arabic Manuscripts Online allows users to download an entire manuscript in different formats (e.g. PDF, JPEG).

A feature allowing comparison between two manuscripts is only provided by Wellcome Arabic Manuscripts Online. The facility to insert notes and make annotations is available in the Manuscript (Makhtota) Digital Library of Arabic Manuscript in PSL.

A service which as yet is non-existent is the ability to browse other resources via the digital library. However, Wellcome Arabic Manuscripts Online has the capacity to provide such a service, as it is a partner of the Digital Resources for Islamic Studies project, which aims to provide open access to some Islamic resources. Also, Islamic theses are currently available online via EThOS. IHP could also provide this service and integrate resources, due to the fact that Harvard University Library is a partner of the Hathi Trust digital library in the US, which contains a vast quantity of digitised collections, and among these collections are resources relating to Arabic manuscripts.

In conclusion, it has been noted that three suggested digital library functions - federated search engines of other libraries' OPACs, integration of knowledge by providing researcher resources, and integrated communication - are not provided by the sample of digital libraries of Arabic manuscripts. The study has found variation in the retrieval and browsing methods provided within the sample. However, the surveyed participants in this study have stated that their most preferred method for searching and retrieving Arabic manuscripts via a digital library is by title (on page 221). This method is not provided by the two digital libraries of Arabic manuscripts

that are established in the KSA. Wellcome Arabic Manuscripts Online provides the majority of the listed digital library services (five out of seven), whereas other digital libraries do not. Therefore, this study comes to provide best practice in a digital library of Arabic manuscripts.

### 7.2.3 The Status of Arabic Manuscripts in the KSA

The Kingdom of Saudi Arabia is one of the countries that holds a large number of Arabic manuscripts (approximately 2,26,804) in the (King Fahad National Library, 2007). These manuscripts are kept in 95 libraries (academic, public, school, special and national) in different parts of the KSA. The precise number of Arabic manuscripts is still unknown due to the lack of comprehensive records and catalogues.

Ten providers of Arabic manuscripts (Chapter Five), who have a large number of Arabic manuscripts (2,88,797) in their collection have reported that they will be providing users access to their Arabic manuscript collections. These selected providers are currently developing their collections in libraries, and are organising and disseminating them. These collections have been developed through purchases, exchanges and donations. However, certain issues such as forgeries and damage of manuscripts due to poor preservation have been reported by the interviewed providers.

Direct access to the original Arabic manuscripts is restricted and is allowed only under specific rules and conditions. Therefore, all the interviewed providers have reported that they will be providing surrogates (in the form of photocopies, or scanned copies) to the users as an alternative of direct access. Moreover, among these surrogates, scanned or digital forms were the most-liked alternative forms accepted by the end users (see on page219).

The other issue reported by the studied end users and providers is that the Arabic manuscripts have been scattered in various places, both globally as well as locally. Therefore, as mentioned by (Liew, 2006; Agosti et al., 2007b), creating a digital library is one of the proposed solutions to access to this type of inscribed heritage. Two digital libraries have already been created by PSL and KAAUL in the KSA. There is a need to further establish digital libraries for Arabic manuscripts in the KSA.

### 7.2.4 The Feasibility of Establishing a Digital Library of Arabic Manuscripts in the KSA

All the studied Arabic manuscript providers have computerised library systems to manage their collections and services. In addition to this, two of the studied providers (KAAUL and PSL) have already made some of the Arabic manuscripts available online (Chapters Four and Five) via digital libraries, while some of the remaining providers studied reported that they plan to build a digital library for their Arabic manuscripts.

All 10 of the providers reported that they have digitalised some of their Arabic manuscripts, taking advantage of the National Preservation of Original Manuscripts Project by KFNL, and/or digitalising Arabic manuscripts by themselves decision.

Various content management systems, be they commercial (the Horizon web platform used by KAAUL) or open source (Greenstone used by the University of Malaya) are currently available and can be utilised to run the digital repository of Arabic manuscripts. However, modifications and customisations of the available system is indeed needed to meet the characteristics of the material (Arabic manuscripts), users' needs, and their requirements.

It can be therefore said that the technical infrastructure is available to establish a digital library of Arabic manuscripts in the KSA. As mentioned by (Agosti et al., 2007a), and (Elloumi et al., 2008), digital material, content management systems and the development of the Content Based on Information Retrieval (CBIR) in respect to the Arabic manuscripts in digital libraries are now available.

End-users showed that they have a considerable amount of experience in using the internet for searching and locating Arabic manuscripts (131) (on page 209). Hundreds of end-users were found looking for the images of Arabic manuscripts on the internet. In addition, the majority of interviewed end-users reported that they have experience in using technology ( on page 184). Moreover, some of the end-users questioned in a survey had already browsed some of the digital libraries of Arabic manuscripts.

It was found that the internet content is often considered rather unreliable by end-users, and dealing with the internet demands caution on the part of manuscriptologists, particularly for citing and quoting information.

## 7.2.5 Providers' Requirements vs. End Users' Requirements in the Process of Establishing a Digital Library of Arabic Manuscripts

Throughout the analysis of the data from the interviews and the survey, it emerged that providers and end-users focused on certain requirements. Generally speaking, the providers pay attention to the technical and security requirements as well as the system that manages the online collection, back-up, supports the Arabic language interface, stores metadata, etc. They emphasised the existing policy of managing the use of the digital library. Retrieving data and running queries are also important to the studied providers, creating the need for a system that provides descriptive metadata (see, 6.6 for further details).

The end users appeared to pay a great deal of attention to the bibliographic data of the Arabic manuscripts as well as to the facility in order to locate the manuscripts via the OPAC search engines, browsing the facilities to retrieve manuscripts. Owning a surrogate of a manuscript, whether a hardcopy or a softcopy, was a requirement of most services by end-users.

In Chapter Six (on page 226), the end-users were found to attach a good deal of importance to cross-searching via other libraries' OPACs, and expressed the wish that such a facility should be provided by all digital libraries. In addition, obtaining a hardcopy of a manuscript in a digital library of Arabic manuscripts has been attracting more end-users than librarians. These differences could be attributed to the end users' behaviour of seeking information and dealing with resources.

## 7.3 Recommendations

Based on this research, several recommendations have been made for establishing a digital library of Arabic manuscripts in the light of users' requirements. These recommendations are made considering the KSA as the study location. However, the researcher considers that the presented recommendations may also be generalised for application in a digital library of Arabic manuscripts for academic as well as scholarly use, such as for editing purposes, in any other location in the world where the same criteria as in KSA apply. The following recommendations are classified into [Mandatory] and [Advisory] based on the study results. This classification is stated at the end of each recommendation.

- The complete cataloguing of Arabic manuscripts by the providers in KSA has been an issue as reported in this study, although the latest technology can be utilised to overcome some barriers, such as lack of professionals. The Library of the University of Michigan has conducted a project of collaboration in cataloguing Islamic manuscripts online, so that the cataloguers can participate in this. The images and the metadata elements of the manuscripts are provided on the Michigan Library website. Similar virtual cataloguing can also be carried out in the KSA. [Mandatory].

- Work toward standardising and unifying the cataloguing and indexing tools for Arabic manuscripts. Moreover, there are a number of rules and standards for describing Arabic manuscripts. [Mandatory]. Examples are as follows:

  o Machine-readable Cataloguing for Archival and Manuscripts Control (MARC-AMC) as an input standard. This format was recommended by (Al-Showaish, 2000) as a format for entering descriptive data of Arabic manuscripts in library automation systems.

  o Text Encoding Initiative (TEI) Guidelines for encoding metadata of Arabic manuscripts. The TEI P5 Guidelines have a specific section

for manuscript description (TEI-ms). The Oxford and Cambridge Islamic Catalogues Online (OCICO) project aims to use the TEI-ms to encode the Islamic manuscript metadata. However, TEI-ms should be examined in light of Arabic manuscript bibliographic and descriptive (i.e. codicological) data. For example; TEI-ms does not contain codes for references (e.g. authority files, bibliographies) that have been used for cataloguing the manuscript.

- Establishing an international online database of Arabic manuscripts around the world is a advisory step towards establishing a digital library. A treasury of Heritage: a Bibliographic Database should be developed and founded. Transforming international bibliographies, such as History of Arabic Heritage and History of Arabic Literature, into electronic databases can be a very useful tool for locating Arabic manuscripts around the world. [Advisory].

- Digitisation of Arabic manuscripts must be subject to guidelines and standards. There are some guidelines available for digitising culture heritage materials, such as Technical Guidelines for Digitizing Culture Heritage Materials, by the Federal Agencies Digitization Guidelines Initiative (FADGI). The Ministry of Tourism and Culture in India launched a project (entitled The National Mission for Manuscripts) in 2003. One of the mission tasks is digitisation of manuscripts across India. Therefore, the mission issued Guidelines for Digitisation of Manuscripts. These guidelines can be utilised; however, it should be taken into account that the guideline information is outdated, especially with regard to technical equipment. [Mandatory].

- The task of establishing a digital library of Arabic manuscripts should be conducted as a national project, governed by the KFNL, for instance. This project should also involve the Arabic manuscript providers in the KSA and take the end-users into consideration as well. Reference can be made to several international projects for a framework, e.g. the DigiIslam project by JISC. [Advisory].

- End-users should be provided full and free access to Arabic manuscripts via digital libraries. However, the provision of Arabic manuscripts should also be controlled, so manuscripts under ongoing editing should be removed from online availability to public via a digital library. [Advisory].

- Digital library should provide several methods for searching, browsing, and retrieving Arabic manuscripts. [Advisory].

- The digital library of Arabic manuscripts should integrate resources such as dictionaries, directories, atlases, etc. The DigiIslam project has provided funds to digitise 1000 PhD theses of Islamic Studies and make them available online at EThOS (http://ethos.bl.uk/). [Advisory].

- Supporting visualisation options, such as a facility to zoom in/out of images, must be provided by digital libraries. [Mandatory].

- Personalisation (saving, downloading and printing) options should be supported by a digital library of Arabic manuscripts. [Advisory].

- A digital library of Arabic manuscripts should be run by a content management system in order to manage the online content. [Mandatory].

- The content management system should be sufficiently compatible to integrate with the providers' OPAC, allowing users to search the OPAC. [Advisory].

- Security issues should be taken into account when establishing a digital library. The use of a watermark in images should not hide any information or damage the image. [Mandatory].

- Policy and terms of use of a digital library of Arabic manuscripts must be stated and accessible the digital library. [Mandatory].

## 7.4 Conclusion

This research project aims to identify users' requirements for establishing a digital library of Arabic manuscripts in the KSA. A number of studies conducted by (Tedd and Large, 2005b; Kimani et al., 2005) have reported the necessity of understanding users' requirements before establishing and developing a digital library (Chapter Three, 3.4.8). It is even more important to identify the users' requirements in case of humanities, e.g. in case of manuscriptologists, since they have specific requirements in terms of dealing with resources, as mentioned by (Crane, 2002), and the studies in this field are relatively limited (Buchanan et al., 2005; Chamnongsri et al., 2010).

Issues raised in the reviewed literature (Chapter Two) regarding Arabic manuscripts in general, include the fact that a large number of Arabic manuscripts have not been catalogued yet, as well as the lack of tools and standards of organising Arabic manuscripts as mentioned by (Nasr, 2007; Halwaji, 2002), specifically in the KSA (Sa`Ati, 1993). These issues still exist and have been mentioned in this study (Chapter Two; see 2.5).

Recently, a number of digital libraries in different part of the world have started offering access to Arabic manuscripts (Chapter Three; see 3.4), while two digital libraries of Arabic manuscripts are located in the KSA itself. A number of studied Arabic providers of manuscripts in the KSA have shown their interest in building a digital library (Chapter Five; see 5.2.5).

The end-users and providers agree on the locating functions, integration of knowledge, written policy and methods of retrieving resources. However, there have been disagreements in this study, in terms of cross-searching for resources through federated search engines to search in other libraries' OPACs. Moreover, end-users

have given high importance to services that provide hard copies of manuscripts in digital libraries.

## 7.5 Significance of the Study

A digital library, as a new platform for providing 'information services' to its potential users, should therefore take users' needs and requirements into account in the early and late stages (development and implementation) of the digital library, as mentioned by (Tedd and Large, 2005a). Taking users' requirements into consideration is a necessity when establishing a digital library, firstly because of the characteristics (physical as well as intellectual) of the Arabic manuscripts, as mentioned by (Alshuhri, 2008), and secondly because the users of Arabic manuscripts (providers as well as end-users) have specific requirements and information-seeking behaviour, much of which has been inherited from previous generations.

This study is considered to be the first study to explore and specify users' requirements (providers and end-users) of Arabic manuscripts for a digital library. In addition to this, it also addresses most of the significant issues regarding making Arabic manuscripts available online via digital libraries, whether from the providers' point of view or that of end-users and hence makes an original contribution to knowledge. This study shows that Arabic manuscriptologists still prefer the "paper document" as a medium for their research, as reported by (Crane, 2002) and (Kimani et al., 2005). Moreover, the main focus of Arabic manuscriptologists is on locating and searching for Arabic manuscripts by using catalogues, bibliographies, handlists, and libraries' OPACs. Therefore, there is a need to develop searching tools and organising standards (e.g. cataloguing rules, metadata, etc.) for Arabic manuscripts.

Therefore, this study also makes a valuable contribution for practitioners who are planning to establish and/or develop a digital library of Arabic manuscripts, as it reveals the users' requirements. This study outlines users' requirements, particularly when dealing with cross-disciplines that are related to the editing of Arabic manuscripts in the KSA. Hence, through the achievement of the research objectives, the aim of the study, which is to explore the requirements of providers and users of Arabic manuscripts in the real world and ways to accommodate these requirements in a digital library (i.e., the virtual world) in order to make recommendations for a best practice for digital libraries of Arabic manuscripts in the KSA. Moreover, in terms of the transfer of knowledge, although the context of this study is the KSA, this findings and recommendations in this study may be used in any country with similar criteria to the KSA that wishes to provide Arabic manuscripts for editing purposes in academia.

## 7.6 Future Research

This research project is focused on exploring users' requirements for establishing a digital library of Arabic manuscripts in the KSA, for academic purposes.

- No previous study has addressed the information-seeking behaviour of Arabic manuscriptologists, which is why there is a need for such a study. Hence, this research has taken a step towards filling the research gap and is therefore able to provide a platform for future research in this field. For instance, further experimental study is needed to evaluate the existing digital libraries of Arabic manuscripts in terms of information retrieval, usability, task appropriateness, etc.

- This research has not thoroughly covered the technical aspect of establishing a digital library of Arabic manuscripts. Further research is needed to examine, for instance, the current systems for managing the content in the light of these research findings and recommendations.

- The study suggests using Functional Requirements for Bibliographic Records (FRBR) as a conceptual model to organise Arabic manuscript collection via a digital library. The use of the FRBR could be examined in future research.

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# APPENDICES

# Appendix A

## Appendix A: Interview Questions for the Ten Providers

1. Could you describe your position, job, and role in this institution?

2. Could you give brief information about the Arabic manuscript collection at your institution?

3. What functions does your library provide, in terms of acquiring, organizing, dissemination of Arabic manuscripts?

4. Does your library have digitised Arabic manuscripts? Can you tell me when, why, where, and how?

5. What are the most significant problems that could be encountered if the collections were made available across the Internet?

6. What are the most important issues and concerns regarding accessibility of the collections of the digital library?

7. To what extent do you agree/disagree with making Arabic manuscripts available on the internet via, for instance, digital libraries, e-forums, and/or websites?

8. Do you have already a digital library for Arabic manuscripts, or have any plans in this regard?

9. What are the key administrative requirements which the digital library should provide, such as statistics and authentications?

10. What are the organising requirements that should be provided via a digital library?

11. What are the service requirements that should be provided by a digital library?

12. In your opinion, what are the second most important resources that should be made available via a digital library of Arabic manuscripts?

13. What sort of services could be delivered to target end-users through the digital library, in terms of personalisation and visualisation?

14. What are the most essential issues and concerns regarding security measures and protection of the manuscripts?

15. Do you have other requirements or comments you would like to add?

## Appendix B

## Interview Questions for the Fourteen End-users

1. Can you describe your field of interest, career, and experience?

2. What are the most commonly-used resources (primary, secondary, and tertiary) for editing Arabic manuscripts?

3. Could you tell me what the difficulties and challenges are which researchers can face in accessing and using Arabic manuscripts in the real world?

4. What type of electronic/online resources have you used for editing Arabic manuscripts?

5. What are the barriers to using electronic/online resources in the context of editing Arabic manuscripts?

6. What makes a good digital library of Arabic manuscripts?

7. Do you have any recommendations and/or comments at the end of this interview session?

# Appendix C

# Example of Coded Transcript

This appendix presents an example of coding transcript of the interview conducted with Arabic manuscripts' provider (PSL). Interviewing language was in Arabic. The following transcript and assigned codes was translated into English language.

Themes and Codes

| Themes | Codes |
|--------|-------|
| Arabic Manuscripts Status (S) | Quantity (S1)<br><br>location (S2)<br><br>Collections (S3)<br><br>Surrogates (S4) |
| Arabic Manuscripts' Providers (P) | Functions (P1)<br><br>Services (P2)<br><br>Technical Process (P3)<br><br>Library System (P4)<br><br>Job (P5)<br><br>Institution (P6)<br><br>Library Function (P7)<br><br>Acquisition (P8)<br><br>Request Services (P9)<br><br>Conservation (P10) |
| Digital Library (DL) | Digitisation (DL1)<br><br>KFNL (DL2)<br><br>Current Digital Library (DL3)<br><br>Future Plan (DL4)<br><br>Scanning Issue (DL5)<br><br>Re-digitisation (DL6)<br><br>Have Digital Library (DL7)<br><br>Agree(DL8)<br><br>Disagree (DL9) |
| Digital Library Requirements (R) | Content Management (R1)<br><br>Content Administration (R2)<br><br>Services and Interface (R3)<br><br>Policy (R4)<br><br>Security (R5)<br><br>Image Browse (R6)<br><br>Metadata (R7) |

| | CMS (R8) |
|---|---|
| | Visualisation requirements (R9) |
| | Zooming in/out (R10) |
| | Authentication feature (R11) |
| | Secondary Resources (R12) |
| | Bibliographies (R13) |
| | Textbooks (R14) |

| Interview Transcript | Codes |
|---|---|
| Q: Could you describe your position, job, and role in this institution?<br><br>PSL: *I have been working in this library for more than 20 years. I was in the Technical Process Department before moving to the Manuscript Department. I have been working in cataloguing manuscripts for 8 years. Now, I am the head Department of Manuscripts at PLS. This department provides services to all academic staff, students, and researchers. And we do also provide services to researchers out-side KSA.* | Job<br>Experience<br>Institution<br>Department |
| Q: Could you give brief information about the Arabic manuscript collection at your institution?<br><br>PSL: *Em..in fact, I could not remember the exact number of PSL collection, however, I'll handle to you a report of PSL achievements and you will find the quantity of Arabic manuscripts in this department. However, original manuscripts it is over ten thousand. We also have manuscripts in several formats, for example, copied on paper, microfilms, have you seen the machines when entered? [ Yes, there are two as I assumed], in fact there are six microfilm readers, three in store due to un working and three are still working. We also have scanned images by KFNL, when they imaged our original Arabic* | Collection quantity<br>Surrogates<br>Digitisation<br>KFNL<br>Digital Library |

| | |
|---|---|
| *manuscripts. some of these images, now, are available online via our website, I think you have seen them [Yes, and we will talk about this later], okay.* | |
| Q: What functions does your library provide, in terms of acquiring, organizing, and dissemination of Arabic manuscripts?<br><br>PSL: *Acquiring Arabic manuscripts in any form and from any place (East to West) is our duty as a scholastic service provider to researchers . We also catalogue and classify Arabic manuscripts all our Arabic manuscripts data are available via the library system,  and this is the role of any institution that serving academic users. And when a user seeks a manuscript that is not available in our collection, we directly send a [surrogate] copy request to the manuscript repository, even if this is abroad, for instance El Escorial Library.  However, receiving a copy may take a long time. But this is our duty to provide as much as possible. But some manuscripts arrived here in miserable condition, therefore, we directly send them to laboratory to clean them from bugs and fix the damages on that manuscript. After making Arabic manuscripts online, manuscripts are now in better situation avoiding misusing and frequent handling them to users.* | Library Function<br>Acquisition<br>Surrogate<br>Library System<br>Request Services<br>Conservation |
| Q: Does your library have digitised Arabic manuscripts? Can you tell me when, why, where, and how?<br><br>PSL: *Three years ago KFNL started a project to scan all original manuscripts in the KSA libraries. And as we have a big collection, KFNL image all manuscripts. However,  [the contractor] who was authorised by KFNL to digitise some of our manuscript collection, there* | Digitisation<br>KFNL<br>Scanning Issue<br>Surrogate<br>Re-digitisation |

| | |
|---|---|
| *were some unclear images of manuscripts, because there was no accurate review at the digitisation process stage. We have decided to re-digitise a selection of Arabic manuscripts in different forms (e.g. original, paper, microform) according to certain criteria, such as high demand, condition, and recommendations by scholars or researchers.* | |
| Q: What are the most significant problems that could be encountered if the collections were made available across the Internet?<br><br>PSL: *Some of our collection is available online, and we believe this initiative can be very helpful to the users. However, we think that many users are misusing this online collection, for instance by downloading many manuscripts and using them for trade purposes, or republishing them on other websites or e-forums without citing the source. Users should be aware of, and adhere to, the use policy.* | Policy<br>Digital Library Issue<br>Misusing |
| Q: To what extent do you agree/disagree with making Arabic manuscripts available on the internet via, for instance, digital libraries, e-forums, and/or websites?<br><br>PSL: *Our collection is already online, you could look at them through a link existed in the PSL's website, or search in Google. It is right the website is unsatisfactory to us, but we, at least, have provided the manuscripts in easy and fast way.* | Have Digital Library<br>Agree<br>Access Online |
| Q: Do you have already a digital library for Arabic manuscripts, or have any plans in this regard?<br>NOTE: THIS QUESTION HAS BEEN ANSWERED IN ABOVE QUESTION | Have Digital Library<br>Future Plan |
| Q: What are the key administrative requirements which the digital library should | CMS<br>Policy |

| | |
|---|---|
| provide, such as statistics and authentications?<br><br>PSL: *What do need are numbers of using our website, this could show us usage percentage. And what is more important is policy that clarify who should use how should use our collection online.* | Authentication feature |
| Q: What are the organising requirements that should be provided via a digital library?<br><br>PSL: *Actually, if the collection is provided by a reasonable system that manage and organise collection would be useful and trustful on the Internet. Nowadays, the PSL has taken initiative to build a portal. The online Arabic manuscripts collection will be immigrated to this portal. However, the portal should support metadata standards, and image browsing, and most important provide security to our collection from hacking.* | Digital Library<br>Content Management<br>Security<br>Image Browse<br>Metadata |
| Q: What are the service requirements that should be provided by a digital library?<br><br>PSL: *I think that provide ability to search all bibliographic date is a very important service should be provided, and browsing images.* | Search Engine<br>Image Browse |
| Q: In your opinion, what are the second most important resources that should be made available via a digital library of Arabic manuscripts?<br><br>PSL: *There are some sort of sources could be included in what you have said digital library, such as,, Em,, other library catalogues, bibliographies, thesis and dissertation directories, as well as possibly some textbooks, should be made available to researchers. No scholarly work can be conducted without these materials; therefore, our role is to provide the* | Secondary Resources<br>Bibliographies<br>Textbooks<br>Library Catalogues<br>Thesis and dissertations Directories<br>Copyright |

| | |
|---|---|
| *[information] source to its user, however, is there any system can include them, and is that allowed by copyright .* | |
| Q: What sort of services could be delivered to target end-users through the digital library, in terms of personalisation and visualisation?<br><br>PSL: *Users may want to be able to zoom in and zoom out the manuscript image during reading and browsing. In our experience it is an issue, therefore, we provide a service to facilitate zooming in/out via the web browser.* | Visualisation requirements<br>Zooming in/out |
| Q: What are the most essential issues and concerns regarding security measures and protection of the manuscripts?<br><br>PSL: *As I have mentioned our concerns are regarding to the legal use of our website by users, that users should have fair access and use of the online manuscripts and the same time that should be aware of PLS policy.* | Security<br>Policy |
| Q: Do you have other requirements or comments you would like to add?<br><br>PSL: *There are no comments that I may be added.* | Extra Comments |
| END OF SESSION ||

The following example presents the coded transcripts of interview was done with End-user (...). Interviewing language was in Arabic. The following transcript and assigned codes was translated into English language.

Themes and Codes:

| Themes | Codes |
|---|---|
| Demographic Data (D) | Job (D1) |
| | Experience (D2) |
| | Skills (D3) |
| | Degree (D4) |
| | Field of Interest (D4) |
| Real-life Activities (A) | Research (A1) |
| | Teaching(A2) |
| | Resources(A3) |
| | Problems (A4) |
| | • Access (AA1) <br> • Publicity (AP1) <br> • Recording (AR1) |
| Users' Requirements (U) | Content Management (U2) |
| | Content Administration (U1) |
| | Service and Interface (U3) |

| Interview Transcript | Codes |
|---|---|
| Q: Can you describe your field of interest, career, and experience? <br><br> P3: *I am working as university staff member in the department of History Studies at [university name]. I used to work as teacher at secondary schools when I finished my BA in History. Then I have moved to the university, I've been dealt with Arabic manuscripts for approximately 22 years. I've supervisoried students in terms of editing Arabic manuscripts. I wrote a book entitled [Title of his book]. I am also a chairman of Arabic Culture Heritage at [University name].* | Job <br> Interest of Field <br> Experience |
| Q: What are the most commonly-used resources (primary, secondary, and tertiary) for editing Arabic manuscripts? | Resources <br> Teaching <br> Research |

| | |
|---|---|
| P3: *There are numbers of resources that researchers and students must use before start studying Arabic manuscripts and during their study. In my book I have addressed several of these resources. Such these resources are bibliographic books in field of Arabic manuscripts. These books are provide to the researchers valuable information and could lead students to make a decision to start editing a manuscript or not. Directories of libraries, thesis, publishing books, etc.. We are working in a systematic research community, so we ask our students to choose an unedited manuscript for their masters or PhD research. Our target is to edit and publish as much as we can under the academic and scientific umbrella they have to survey dissertation directories, and contact other departments to be sure of whether the manuscript has been edited or not. One other resource that I stress to be used is personal communication with scholars to suggest a manuscript to be studied or even helping in such difficulties in reading the manuscript.* | |
| Q: Could you tell me what the difficulties and challenges are which researchers can face in accessing and using Arabic manuscripts in the real world?<br><br>P3: *It could be the obvious problem facing manuscriptlogists is controlling and recording Arabic manuscripts, therefore, you will find many Arabic manuscripts around the world are hidden up to now, because they are as yet uncatalogued. Therefore, we don't know where these manuscripts are kept. The second problem is accessing the manuscripts. A manuscript could be kept in different part of the world and a* | Problem<br>Access<br>Publicity<br>Recording |

| | |
|---|---|
| *student could not access the manuscript due geographical barrier, cost, and/or library policy. The nature of the manuscript should be taken into account, which some manuscripts have been written in unfamiliar font type (e.g. Moroccan Font) to the student. Moreover, some manuscripts have missed parts. These parts are vital in the context of the manuscripts, and I had number of such these manuscripts, so I advice my student to identify and verify before start editing to avoid getting in terrible.* | |
| Q: What type of electronic/online resources have you used for editing Arabic manuscripts?<br><br>P3: *My book was written 12 years ago, and I am going to issue a new edition and include the recent technology that is used. I addressed in my book of the use of equipment to read manuscripts in that time such as microfilm readers. Nowadays, I'm encouraging my students to take advantage of the Internet as a tool for locating manuscripts and using the available technologies for this purpose. By the way I've been using these technologies since 1984 and I owned a microfilm reader a long time ago. However, Arabic manuscripts should be respected and not be vulnerable by letting people to expose Arabic manuscripts on the Internet without rules and procedures. Therefore, they should be provided via a system that secure and saves these manuscripts. I would give an example, [UNESCO] has launched a digital library of some manuscripts. Our institution should take advantage of such a project.* | Skills<br>Content Management |
| Q: What are the barriers to using electronic/online resources in the context of editing Arabic manuscripts? | Content Management<br>Service and Interface<br>Access |

| | Content Administration |
|---|---|
| P3: *I think that some of Arabic manuscripts holders such as; academic libraries they just look for how to save their rights of holding Arabic manuscript. I saw manuscripts that are available via [Library name] have made something wrong, I believe that [library name] made a big mistake when they put their logo as the background of each scanned Arabic manuscript page, how this happened, I do not know? many features of the manuscript then disappeared. For example, the type of paper cannot be recognized. As researcher every tiny information is very important, and if paper type of a manuscript is unknown this could effect on identifying the manuscript date, or figuring out if the manuscript is fake. The other issue is rules of access to manuscripts, making the whole Arabic manuscript collection of the university library available online will lead to misuse of these manuscripts, and will conflict with our academic role in editing Arabic manuscripts. A number of Arabic manuscripts in the library are preserved by our department because our students are working on editing them as part of their academic degrees. So, I think [the] library should manage access to the manuscripts by public. The library should consult academic departments in order to manage access to the manuscripts.* | |
| Q: What makes a good digital library of Arabic manuscripts?<br><br>P3: *In order to make a good digital library, as you've said, that the library who is providing Arabic manuscripts to its community, must recognise what [users] needs, what resources they have desired, and what services should be* | Service and Interface |

| | |
|---|---|
| *provided [acknowledgements to the research topic]. I've seen number of digital library provide facility to zoom in/out of manuscripts images. Indeed, this such feature would be helpful during reading of the manuscripts.* | |
| Q: Do you have any recommendations and/or comments at the end of this interview session?<br><br>P3: *I could be helpful to integrate personal communication in a digital library, this may allow to exchange information, especially in terms of locating Arabic manuscripts. E-forums have gained considerable subscribers due to providing communication feature.* | Service and Interface |
| END OF SESSION | |

# Appendix D

## Questionnaire Survey [English and Arabic]

English Questionnaire

# Digital Library of Arabic Manuscripts: a Questionnaire

## Dear Participant,

I am carrying out a study to obtain a Ph.D degree from university of Strathclyde in the United Kingdom. The study is entitled "Establishment of a Digital Library of Arabic Manuscripts". Part of this research is to identify potential users' requirements of a digital library of Arabic manuscripts and one of the tools for this identification is this questionnaire.

As you are experienced and knowledgeable in manuscriptology,  and/or librarian in an Arabic manuscript's department, you have been selected as one of the participants.

*All the information given will be strictly confidential, and used only for research purposes; therefore, you are encouraged to feel free to give your honest opinion. For further questions, please do not be hesitated to contact e-mail me.*

**Sulieman Alshuhri. BA, MSc.**
**CIS, University of Strathclyde**
**E-mail address: dlibams@gmail.com**

**N.B. the following definitions are used in this questionnaire**.

**Digital Library**: a set of information resources (e.g. manuscripts) in digital forms, organized, and accessible via the Internet.

**Arabic manuscripts**: an Arabic text that was written by hand in a codex form before the invention of printing in Arab countries.

**Social networking websites**: websites that allow users to share, bookmark, store, and/or link their opinions, interests, pictures, and/or experiences.

**1)** Name: (Optional)

☐

**2)** E-mail address: (Optional)

☐

**3)** Gender:

**4)** Age:

○ Less than 17
○ 17-30
○ 31-43
○ 44-56
○ Over 57

**5)** Your most recent qualification:

☐ Secondary school
☐ Bachelor
☐ Master's
☐ Ph.D
☐ Other, please specify:

☐

**6)** How would you describe yourself? (Choose all that are applicable)

- [ ] Post-graduate student
- [ ] Undergraduate student
- [ ] Librarian
- [ ] University staff member
- [ ] Researcher
- [ ] Arabic manuscripts broker/collector
- [ ] Other, please specify:

[                    ]

**7)** Please describe the length of time you have been dealing with Arabic manuscripts:

- ( ) Less than a year
- ( ) 1-3 years
- ( ) 4-6 years
- ( ) More than 6 years, please specify:

[                    ]

Second Page

**8)** How would you evaluate your ICT experience?

- ( ) Excellent
- ( ) Very good
- ( ) Good
- ( ) Quite good
- ( ) Weak
- ( ) Prefer not to answer

**9)** How frequently do you use the Internet?

- ( ) Daily
- ( ) Weekly
- ( ) Monthly

○ Sporadically

○ Never

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**\*10)** Do use the Internet for your research?

○ Yes

○ No

*Logical skip: if "No" move to Q22.

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**11)** Which of the following reliable resources have you used? (Choose all that are applicable)

☐ Personal websites

☐ Electronic forums

☐ Digital libraries

☐ Blogs

☐ E-mail news groups

☐ Libraries, museums, archive centre websites

☐ Other, please specify:

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**\*12)** Have you ever used the Internet to search for Arabic manuscripts?

○ Yes

○ No

*Logical skip: If "No" move to Q15

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**13)** _If Yes_, what were you looking for? (Choose all that are applicable)

☐ Arabic manuscript images

☐ Authors' biographies

☐ Arabic manuscript printed-catalogues

☐ Arabic manuscript textbooks

☐ Glossaries, encyclopaedias, directories and atlases related to Arabic manuscripts

☐ Seeking guidance or help from professionals

☐ Other, please specify:

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**14)** Could you please write down frequented used websites, digital libraries, e-forums, etc which have been used in terms of searching and/or locating Arabic manuscripts?

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|  |

**15)** From your experience, how important do you consider the Internet to be as a tool for your research on Arabic manuscripts? (Please specify why)

○ Important

○ No preference

○ Not important

Please give a reason/s for your answer::

**16)** Which of the following media do you prefer to use to browse Arabic manuscript as an alternative to the original form?

|  | Like best | Like | No preference | Do not like very much | Do not like at all |
|---|---|---|---|---|---|
| Arabic manuscript image on digital media (e.g. CD-ROM, DL) | ◯ | ◯ | ◯ | ◯ | ◯ |
| Paper-based Arabic manuscript | ◯ | ◯ | ◯ | ◯ | ◯ |
| Arabic manuscript in microform | ◯ | ◯ | ◯ | ◯ | ◯ |

**17)** To what extent do you consider the following elements important in the digital library of Arabic manuscripts?

|  | Very Important | Important | No Preference | Less Important | Not Important |
|---|---|---|---|---|---|
| Arabic manuscript images | ◯ | ◯ | ◯ | ◯ | ◯ |
| Bibliographic data (metadata) of Arabic manuscripts | ◯ | ◯ | ◯ | ◯ | ◯ |
| Integrated e-forum, blog, wiki | ◯ | ◯ | ◯ | ◯ | ◯ |
| Federated search engine for libraries' OPACs | ◯ | ◯ | ◯ | ◯ | ◯ |
| Research tools (e.g. | ◯ | ◯ | ◯ | ◯ | ◯ |

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dictionaries,
biographies, directories,
references books,
textbooks, atlases)

**18)** How do you prefer to locate Arabic manuscript in a digital library?

| | Like Best | Like | No preference | Do not like very much | Do not like at all |
|---|---|---|---|---|---|
| Browsing by titles of Arabic manuscript titles | ◯ | ◯ | ◯ | ◯ | ◯ |
| Browsing by subjects of Arabic manuscripts | ◯ | ◯ | ◯ | ◯ | ◯ |
| Browsing by authors of Arabic manuscripts | ◯ | ◯ | ◯ | ◯ | ◯ |
| Browsing by thumbnails of Arabic manuscripts | ◯ | ◯ | ◯ | ◯ | ◯ |
| Using search engine to search through entire Arabic manuscript bibliographic data (metadata) | ◯ | ◯ | ◯ | ◯ | ◯ |

**19)** What kinds of technical services would you consider most important for a digital library of Arabic manuscripts?

| | Very Important | Important | No Preference | Less Important | Not Important |
|---|---|---|---|---|---|
| Ability to download/save images of Arabic manuscripts | ◯ | ◯ | ◯ | ◯ | ◯ |
| Ability to zoom in/out of images in Arabic manuscripts | ◯ | ◯ | ◯ | ◯ | ◯ |
| Ability to share images of Arabic manuscripts via social networking (e.g., CiteULike, | ◯ | ◯ | ◯ | ◯ | ◯ |

Facebook, Delicious,
etc.)

| | | | | | |
|---|---|---|---|---|---|
| Ability to print out images of Arabic manuscripts | ◯ | ◯ | ◯ | ◯ | ◯ |
| Ability to compare more than one image side-by-side in the browser | ◯ | ◯ | ◯ | ◯ | ◯ |
| Ability to browse and search the assistance tools (e.g. dictionaries, biographies, directories, bibliographies, references works, etc.) in the digital library. | ◯ | ◯ | ◯ | ◯ | ◯ |
| Ability to insert comments on Arabic manuscripts images (personal annotations) | ◯ | ◯ | ◯ | ◯ | ◯ |

**20)** Beside Arabic manuscripts, what would you consider necessary in the digital library?

| | Very Important | Important | No Preference | Less Important | Not Important |
|---|---|---|---|---|---|
| Arabic manuscripts text-books, and references | ◯ | ◯ | ◯ | ◯ | ◯ |
| Directories of theses and dissertations | ◯ | ◯ | ◯ | ◯ | ◯ |
| Dictionaries and glossaries | ◯ | ◯ | ◯ | ◯ | ◯ |
| Bibliographies of Arabic manuscripts | ◯ | ◯ | ◯ | ◯ | ◯ |
| Journals of Arabic manuscript | ◯ | ◯ | ◯ | ◯ | ◯ |
| Atlases | ◯ | ◯ | ◯ | ◯ | ◯ |
| Biographies | ◯ | ◯ | ◯ | ◯ | ◯ |
| Catalogues of Arabic manuscripts | ◯ | ◯ | ◯ | ◯ | ◯ |

**21)** Are there any other materials that you would like to add? (If so, please list them below and specify why they are important to you):

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**22)** If there are any comments, notes, or recommendations you would like to add, please list them below:

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# نحو مكتبة رقمية للمخطوطات العربية

## "استبانة عن احتياجات المستفيدين من مكتبة رقمية للمخطوطات العربية "

أخي الباحث \ أختي الباحثة :

**السلام عليكم ورحمة الله وبركاته،،، وبعد    :**

**إن إسهامك بتعبئة هذه الاستبانة محط تقدير واحترام، لهذا فإن ما ستقدمه سيكون تحت كامل السرية والخصوصية ولن يتم استخدامه لغير أغراض البحث العلمي فقط. أمل أخي الباحث أختي الباحثة منك مراعاة بعض المصطلحات والتي سترد في متن هذا الاستبيان وهي كما يلي:**

- المكتبة الرقمية /Digital Library: هي مجموعة من مصادر المعلومات الإلكترونية (كالمخطوطات) المتاحة بشكل منظم لتيسير سبل الوصول إليها والإفادة منها من خلال الإنترنت على سبيل المثال.
- المخطوط العربي Arabic Manuscript هو النص العربي الذي كتب بخط اليد قبل انتشار تقنية الطباعة والمطابع.
- شبكات المشاركة الاجتماعية /Social Networking: هي تلك المواقع التي تمكن المستفيدين من إضافة أو حفظ المواقع أو الصور أو المقالات المفضلة لديهم مثل:

الفيس بوك FaceBook  -  فليكر Flickr  -  دليشز Delicious

**هذا ولكم وافر شكري وتقديري**

**سليمان سالم الشهري**

**للإستفسارات: الهاتف المحمول:**

**البريد الإلكتروني dlibams@gmail.com :**

**الاسم:** (اختياري)    1)

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└────────────────────────────┘
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**عنوان البريد الإلكتروني:** (اختياري)    2)

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┌────────────────────────────┐
│                            │
└────────────────────────────┘
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**الجنس:**    3)

**الفئة العمرية التي تتبع لها:**    4)

- ○ أقل من 17
- ○ من 17 إلى 30
- ○ من 31 إلى 43
- ○ من 44 إلى 56
- ○ 57 فما فوق

**آخر مؤهل علمي حصلتم عليه، هو:**    5)

- ☐ الشهادة الثانوية العامة
- ☐ درجة البكالوريس
- ☐ درجة الماجستير
- ☐ درجة الدكتوراه
- ☐ أخرى (الرجاء التحديد:)

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┌────────────────────────────┐
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└────────────────────────────┘
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**الوظيفة:** (اختر المناسب)    6)

- ☐ طالب دراسات عليا
- ☐ طالب مرحلة بكالوريس
- ☐ اختصاصي مكتبات ومعلومات

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☐ عضو هيئة تدريس

☐ باحث

☐ جامع أو تاجر مخطوطات عربية

☐ غير ذلك (الرجاء التحديد:)

[ ]

7) **عدد سنوات الخبرة التي تتمتعون بها في التعامل مع المخطوطات العربية:**

○ أقل من سنة

○ من سنة إلى ثلاث سنوات

○ من أربع سنوات إلى ست سنوات

○ أكثر من ست سنوات (أرجو التحديد:)

[ ]

8) **مدى خبرتكم في استخدام الحاسب الآلي وتطبيقاته:**

○ ممتاز

○ جيد جداً

○ جيد

○ لا بأس

○ ضعيف

○ لا
إجابة

9) **معدل استخدامكم للإنترنت:**

○ يومي

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○ أسبوعي

○ شهري

○ بشكل متقطع

○ سنوي

○ لا استخدمه

**10) هل تستخدم الإنترنت في الأبحاث التي تعدونها؟** *

○ نعم

○ لا: إنتقل الى السؤال 22.

**11) أنماط مصادر المعلومات التي قمتم بالإفادة منها والتعامل معها خلال الإنترنت؟** (اختر المناسب)

☐ المنتديات الإلكترونيةForums

☐ المدوناتBlogs

☐ المواقع الشخصيةPersonal websites

☐ المكتبات الرقميةDigital libraries

☐ مواقع المكتبات والمتاحف و الأرشيفات على الشبكة العنكبوتية Libraries, museums, archives websites

☐ المجموعات البريدية الإخباريةNews Groups

☐ غير ذلك (أرجو التوضيح:(

**12) هل سبق وأن استخدمت الإنترنت لإيجاد أو استرجاع أو البحث عن المخطوطات العربية؟** *

○ نعم

○ لا: انتقل إلى السؤال 15.

**13) إذا كانت الإجابة بنعم، فما الذي كنت تبحث عنه؟** (اختر المناسب)

☐ قواميس اللغة والموسوعات والأدلة ومعاجم البلدان والأطالس المتعلقة بالمخطوطات

☐ الكتب الدراسية للمخطوطات العربية (مثل كتاب تحقيق النصوص ونشرها لعبدالسلام هارون(

☐

☐ فهارس المخطوطات العربية المطبوعة

☐ كتب السير والتراجم المتعلقة بالمخطوطات

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ببليوجرافيات المخطوطات العربية (مثل كشف الظنون عن أسامي الكتب والفنون لحاجي خلفية) ☐

البحث عن مساعدة أو إرشاد من قِبل المختصين ☐

صور لمخطوطة عربية ☐

غير ذلك (أرجو التوضيح:) ☐

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**14) ماهي المواقع التي قمتم باستخدامها للبحث عن مخطوطات عربية؟**

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**15) من واقع خبرتك، إلى أي مدى تعد الانترنت أداة من الأدوات البحثية التي تستخدمها للتعامل مع المخطوطات العربية؟**

<u>(أرجو ذكر سبب اختيار الإجابة)</u>

◯ مهم

◯ لا تفضيل

◯ غير مهم

لماذا اخترت هذه الإجابة : [ ]

**16) أي من الوسائط التالية تُفضل الاطلاع وتصفح المخطوط العربي كبديل عن النسخة الأصلية؟ (الرجاء تقييمها وفقاً للأفضلية)**

| | غير مُفضل على الإطلاق | غير مُفضل | مُحايد | مُفضل | مُفضل جداً |
|---|---|---|---|---|---|
| صورة للمخطوط العربي على وسيط رقمي (مثلاً على سي دي روم-CD ROM أو من خلال مكتبة رقمية( | ○ | ○ | ○ | ○ | ○ |
| صورة للمخطوط العربي على وسيط ورقي (في شكل ورقي وليس في شكل المخطوط الأصلي( | ○ | ○ | ○ | ○ | ○ |
| صورة للمخطوط العربي على وسيط ميكروفيلم أو ميكروفيش | ○ | ○ | ○ | ○ | ○ |

**17) إلى أي مدى تكمن أهمية توافر العناصر التالية في المكتبة الرقمية للمخطوطات العربية من وجهة نظرك؟**

| | مهم جدا | مهم | محايد | اقل اهمية | غير مهم |
|---|---|---|---|---|---|
| صور المخطوطات العربية | ○ | ○ | ○ | ○ | ○ |
| البيانات الببليوجرافية للمخطوطات العربية | ○ | ○ | ○ | ○ | ○ |
| تضمين منتدى او مدونة أو ويكي | ○ | ○ | ○ | ○ | ○ |
| محرك بحث شامل لفهارس المكتبات | ○ | ○ | ○ | ○ | ○ |

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| | | | | المتاحة مباشرة |
|---|---|---|---|---|
| ⚪ | ⚪ | ⚪ | ⚪ | ⚪ |

| | | | | عدة البحث مثل القواميس، كتب السير، الادلة، الاطالس، الكتب الدراسية |
|---|---|---|---|---|
| ⚪ | ⚪ | ⚪ | ⚪ | ⚪ |

**18) ما هي الطريقة التي تفضل أن تُعرض بها المخطوطات العربية في المكتبة الرقمية ليسهل الوصول إليها؟**

| | غير مفضل على الاطلاق | قليل التفضيل | محايد | مفضل | مفضل جدا |
|---|---|---|---|---|---|
| تصفح المخطوطات بالعنوان | ⚪ | ⚪ | ⚪ | ⚪ | ⚪ |
| تصفح المخطوطات بالموضوع | ⚪ | ⚪ | ⚪ | ⚪ | ⚪ |
| تصفح المخطوطات باسماء المؤلفين | ⚪ | ⚪ | ⚪ | ⚪ | ⚪ |
| تصفح المخطوطات بالصور | ⚪ | ⚪ | ⚪ | ⚪ | ⚪ |
| استخدام محرك بحث يبحث في كافة البيانات الببليوجرافية | ⚪ | ⚪ | ⚪ | ⚪ | ⚪ |

**19) ما هي الخدمات التقنية التي تشكل أهمية من وجهة نظرك في المكتبة الرقمية للمخطوطات العربية؟**

| | غير مهم | أقل اهمية | محايد | مهم | مهم جدا |
|---|---|---|---|---|---|
| إمكانية تنزيل وحفظ صور المخطوطات العربية | ⚪ | ⚪ | ⚪ | ⚪ | ⚪ |
| إمكانية تصغير وتكبير صور المخطوطات العربية | ⚪ | ⚪ | ⚪ | ⚪ | ⚪ |
| إمكانية مشاركة صور المخطوطات عبر شبكات التواصل الاجتماعية (مثل CiteULike, Facebook, Delicious, etc.) | ⚪ | ⚪ | ⚪ | ⚪ | ⚪ |
| إمكانية طباعة صور المخطوطات العربية | ⚪ | ⚪ | ⚪ | ⚪ | ⚪ |
| إمكانية مقارنة اكثر من صفحة خلال المتصفح للمخطوطات العربية | ⚪ | ⚪ | ⚪ | ⚪ | ⚪ |
| إمكانية التصفح والبحث في عدة البحث مثل | ⚪ | ⚪ | ⚪ | ⚪ | ⚪ |

| | مهم جدا | مهم | محايد | أقل اهمية | غير مهم |
|---|---|---|---|---|---|
| (e.g. dictionaries, biographies, directories, bibliographies, references works, etc في المكتبة الرقمية | | | | | |
| المقدرة لإدراج تعليق على صورة المخطوط | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |

**20) بجانب المخطوطات العربية، ما المصادر التي ترى ضرورة تواجدها في المكتبة الرقمية؟**

| | مهم جدا | مهم | محايد | أقل اهمية | غير مهم |
|---|---|---|---|---|---|
| المراجع والكتب الدراسية للمخطوطات العربية | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |
| أدلة الرسائل الجامعية | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |
| القواميس والمعاجم اللغوية | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |
| ببليوغرافيات للمخطوطات العربية | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |
| الدوريات المختصة بالمخطوطات العربية | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |
| الاطالس ومعاجم البلدان | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |
| كتب السير والتراجم | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |
| فهراس المخطوطات العربية | ⭕ | ⭕ | ⭕ | ⭕ | ⭕ |

**21) هل هناك مصادر أخرى تود إضافتها؟**
( الرجاء توضيح لماذا هي ذات أهمية )

**22) ملاحظات أو تعليقات أو توصيات تود إضافتها:**

# Appendix E

## Arabic Manuscripts in the KSA Providers

| No. | Library Type | No. of AMSs | Library Collection | AMSs Percentage of Library's Collection |
|---|---|---|---|---|
| 1. | Academic | 2 | 3133 | 0.06% |
| 2. | Academic | 3 | 35050 | 0.01% |
| 3. | Academic | 4 | 4503 | 0.09% |
| 4. | Academic | 4 | 10424 | 0.04% |
| 5. | Academic | 5 | 13527 | 0.04% |
| 6. | Academic | 5 | 7994 | 0.06% |
| 7. | Academic | 5 | 28788 | 0.02% |
| 8. | Academic | 6 | 25313 | 0.02% |
| 9. | Academic | 10 | 42604 | 0.02% |
| 10. | Academic | 15 | 29549 | 0.05% |
| 11. | Academic | 51 | 45226 | 0.11% |
| 12. | Academic | 114 | 15955 | 0.71% |
| 13. | Academic | 271 | 33687 | 0.80% |
| 14. | Academic | 5000 | 466085 | 1.07% |
| 15. | Academic | 21129 | 824428 | 2.56% |
| 16. | Academic | 21998 | 1336533 | 1.65% |
| 17. | Academic | 23638 | 201941 | 11.71% |
| 18. | Academic | 50000 | 1100249 | 4.54% |
| 19. | Public | 1 | 38101 | 0.00% |
| 20. | Public | 5 | 6075 | 0.08% |
| 21. | Public | 5 | 6312 | 0.08% |
| 22. | Public | 6 | 1866 | 0.32% |
| 23. | Public | 7 | 13763 | 0.05% |
| 24. | Public | 10 | 1427 | 0.70% |
| 25. | Public | 40 | 5000 | 0.80% |
| 26. | Public | 40 | 6462 | 0.62% |
| 27. | Public | 42 | 24705 | 0.17% |
| 28. | Public | 50 | 700 | 7.14% |
| 29. | Public | 450 | 6600 | 6.82% |
| 30. | Public | 2100 | 34152 | 6.15% |
| 31. | Public | 6523 | 122556 | 5.32% |

| | | | | |
|---|---|---|---|---|
| 32. | Public | 8600 | 1299300 | 0.66% |
| 33. | Public | 13000 | 323001 | 4.02% |
| 34. | Public | 15722 | 118112 | 13.31% |
| 35. | Special | 1 | 1484 | 0.07% |
| 36. | Special | 2 | 10034 | 0.02% |
| 37. | Special | 4 | 4947 | 0.08% |
| 38. | Special | 4 | 436 | 0.92% |
| 39. | Special | 5 | 3045 | 0.16% |
| 40. | Special | 6 | 15208 | 0.04% |
| 41. | Special | 7 | 544 | 1.29% |
| 42. | Special | 250 | 14462 | 1.73% |
| 43. | Special | 51501 | 250002 | 20.60% |
| 44. | School | 1 | 1391 | 0.07% |
| 45. | School | 1 | 5265 | 0.02% |
| 46. | School | 1 | 347 | 0.29% |
| 47. | School | 2 | 286 | 0.70% |
| 48. | School | 2 | 689 | 0.29% |
| 49. | School | 2 | 528 | 0.38% |
| 50. | School | 2 | 726 | 0.28% |
| 51. | School | 2 | 566 | 0.35% |
| 52. | School | 2 | 373 | 0.54% |
| 53. | School | 2 | 1060 | 0.19% |
| 54. | School | 3 | 1439 | 0.21% |
| 55. | School | 3 | 1954 | 0.15% |
| 56. | School | 3 | 807 | 0.37% |
| 57. | School | 5 | 145 | 3.45% |
| 58. | School | 5 | 3800 | 0.13% |
| 59. | School | 6 | 553 | 1.08% |
| 60. | School | 6 | 22012 | 0.03% |
| 61. | School | 6 | 906 | 0.66% |
| 62. | School | 8 | 1005 | 0.80% |
| 63. | School | 8 | 1135 | 0.70% |
| 64. | School | 8 | 816 | 0.98% |
| 65. | School | 8 | 4408 | 0.18% |
| 66. | School | 9 | 115 | 7.83% |
| 67. | School | 10 | 417 | 2.40% |
| 68. | School | 10 | 569 | 1.76% |
| 69. | School | 10 | 400 | 2.50% |

| | | | | |
|------|----------|--------|---------|--------|
| 70. | School | 11 | 239 | 4.60% |
| 71. | School | 12 | 158 | 7.59% |
| 72. | School | 17 | 2586 | 0.66% |
| 73. | School | 18 | 1170 | 1.54% |
| 74. | School | 20 | 532 | 3.76% |
| 75. | School | 20 | 895 | 2.23% |
| 76. | School | 20 | 370 | 5.41% |
| 77. | School | 21 | 105 | 20.00% |
| 78. | School | 25 | 1590 | 1.57% |
| 79. | School | 30 | 1630 | 1.84% |
| 80. | School | 38 | 131 | 29.01% |
| 81. | School | 40 | 6028 | 0.66% |
| 82. | School | 41 | 779 | 5.26% |
| 83. | School | 43 | 2125 | 2.02% |
| 84. | School | 50 | 116 | 43.10% |
| 85. | School | 50 | 500 | 10.00% |
| 86. | School | 56 | 822 | 6.81% |
| 87. | School | 57 | 622 | 9.16% |
| 88. | School | 60 | 9854 | 0.61% |
| 89. | School | 62 | 60219 | 0.10% |
| 90. | School | 93 | 18000 | 0.52% |
| 91. | School | 134 | 11629 | 1.15% |
| 92. | School | 200 | 4900 | 4.08% |
| 93. | School | 250 | 2157 | 11.59% |
| 94. | School | 470 | 581 | 80.90% |
| 95. | National | 4200 | 3021901 | 0.14% |
| | Total | 226804 | 9734634 | 2.33% |