VIABILITY OF DEVELOPING DIGITAL LIBRARIES IN ACADEMIC INSTITUTIONS: THE CASE OF CATHOLIC UNIVERSITY OF RWANDA

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2015
DECLARATION

This research project is my original work and has not been submitted for examination to any other university.

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This research project has been submitted for examination with our approval as the university supervisors.

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DEDICATION

This project is dedicated to the late Monsignor Félicien Mubiligi whose words of encouragement and persistent promptings for my perseverance in this endeavour still reverberate in my mind. May the good Lord grant him his eternal reward.
ACKNOWLEDGEMENTS

God has been gracious to me through many people who helped me during the course of this research; to Him be glory and honour forever. Any project like this is always a team effort. I could never be thankful enough to the many people who assisted me during the process of this study. To each and all: please accept my sincere and profound thanks.

I wish to extend my appreciation and gratitude to the Department of Library and Information Science of the University of Nairobi for giving me the opportunity to undertake this course. My sincere gratitude to my supervisors Dr Dorothy Njiraine and Dr Grace Irura for the tireless support and supervision they have accorded me since I started this research project. Their guidance has been extensive and the least I can do is to thank them and to assure them of my kindest thoughts. I also wish to express my indebtedness to the lecturers who coached me throughout the course, as well as to my fellow students with whom team work contributed towards making this project a success. I am also grateful to the respondents for answering the questions honestly. Last but not least I thank my family and friends for their continuing support and encouragement.
TABLE OF CONTENTS

DECLARATION.......................................................................................................................... ii
DEDICATION ............................................................................................................................ iii
ACKNOWLEDGEMENTS ........................................................................................................ iv
TABLE OF CONTENTS ............................................................................................................ v
LIST OF TABLES ...................................................................................................................... viii
LIST OF FIGURES .................................................................................................................... ix
LIST OF ABBREVIATIONS AND ACRONYMS ................................................................. x
ABSTRACT ............................................................................................................................... xi

CHAPTER ONE .......................................................................................................................... 1
INTRODUCTION ......................................................................................................................... 1
1.1 Background to the Study .................................................................................................... 1
1.1.1 Development of Digital Libraries .............................................................................. 1
1.1.2 The Catholic University of Rwanda ........................................................................ 3
1.2 Statement of the Problem ............................................................................................... 4
1.3 Aim of the Study ............................................................................................................. 4
1.4 Research Questions ......................................................................................................... 5
1.5 Assumptions of the Study ............................................................................................... 5
1.6 Scope of the Study ......................................................................................................... 6
1.7 Limitations of the Study ................................................................................................. 6
1.8 Significance of the Study ............................................................................................... 7
1.8.1 Theoretical Significance ......................................................................................... 7
1.8.2 Practical Significance ............................................................................................. 7
1.8.3 Policy-related Significance ..................................................................................... 7
1.9 Definition of Operational Terms and Concepts ......................................................... 7
1.10 Chapter Summary ......................................................................................................... 10

CHAPTER TWO ........................................................................................................................ 11
LITERATURE REVIEW ........................................................................................................... 11
2.1 Introduction ..................................................................................................................... 11
2.2 Digital Information and Libraries Background .......................................................... 11
2.3 Rationale for Developing Digital Libraries ................................................................ 12
2.4 Basic Requirements in Developing Digital Libraries ................................................ 14
2.4.1 Content .................................................................................................................... 14
2.4.2 Right People ........................................................................................................... 15
2.4.3 Usable Systems/Technology .................................................................................. 15
2.4.4 Open Access .......................................................................................................... 16
2.4.5 Data Rights / Intellectual Property and Privacy .................................................. 16
2.4.6 Automate Whenever Possible .............................................................................. 17
2.4.7 Standards ............................................................................................................... 18
2.4.8 Quality .................................................................................................................... 18
2.4.9 Persistence / Maintenance and Accessibility ...................................................... 19

v
**LIST OF TABLES**

Table 1. Challenges in the Digital Library Environment ........................................ 21

Table 2. Sample size ........................................................................................................ 33

Table 3. Questionnaires’ Response Rate ......................................................................... 39

Table 4. Getting Best Information in Different Formats ................................................. 46

Table 5. Integrating Access to Both Digital and Physical Materials ............................. 61

Table 6. Encouraging Local Publication by both Students and Lecturers .................... 63

Table 7. Responses’ Ratio of additional strategies .......................................................... 64
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1.</td>
<td>Conceptual Framework for the Study</td>
<td>29</td>
</tr>
<tr>
<td>Figure 2.</td>
<td>Gender of Respondents</td>
<td>40</td>
</tr>
<tr>
<td>Figure 3.</td>
<td>Summary of Respondents’ Responses on Effectiveness of Developing Digital Library</td>
<td>45</td>
</tr>
<tr>
<td>Figure 4.</td>
<td>Sharing Information with Similar Institutions</td>
<td>47</td>
</tr>
<tr>
<td>Figure 5.</td>
<td>Having Understandable Information</td>
<td>47</td>
</tr>
<tr>
<td>Figure 6.</td>
<td>Never Visit a Library Building Again</td>
<td>48</td>
</tr>
<tr>
<td>Figure 7.</td>
<td>Being Aware of the User Needs</td>
<td>49</td>
</tr>
<tr>
<td>Figure 8.</td>
<td>Summary of Respondents’ Responses on Basic Requirements for Developing Digital Libraries</td>
<td>54</td>
</tr>
<tr>
<td>Figure 9.</td>
<td>Summary of the Challenges in Developing Digital Libraries</td>
<td>58</td>
</tr>
<tr>
<td>Figure 10.</td>
<td>Careful Staff Training and Recruitment</td>
<td>59</td>
</tr>
<tr>
<td>Figure 11.</td>
<td>Management Support and Empowering</td>
<td>60</td>
</tr>
<tr>
<td>Figure 12.</td>
<td>Adherence to Standards and Data Rights</td>
<td>62</td>
</tr>
</tbody>
</table>
# LIST OF ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASCII</td>
<td>American Standard Code for Information Interchange</td>
</tr>
<tr>
<td>CUR</td>
<td>Catholic University of Rwanda</td>
</tr>
<tr>
<td>HEC</td>
<td>Higher Education Commission</td>
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<tr>
<td>HTML</td>
<td>Hyper Text Markup Language</td>
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<tr>
<td>ICTs</td>
<td>Information and Communication Technologies</td>
</tr>
<tr>
<td>MS-Excel</td>
<td>Microsoft Excel</td>
</tr>
<tr>
<td>SGML</td>
<td>Standard Generalized Markup Language</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Packages for Social Sciences</td>
</tr>
<tr>
<td>TIFF</td>
<td>Tagged Image File Format</td>
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<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
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<tr>
<td>WWW</td>
<td>World Wide Web</td>
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</tbody>
</table>
ABSTRACT

The aim of the study was to assess the viability of developing digital libraries in academic institutions with particular reference to the Catholic University of Rwanda (CUR). This was done by initially establishing the need for developing a digital library at the CUR. The objectives were to determine the basic requirements for developing a digital library; finding out challenges that are encountered during the process of digital library development; and by suggesting a framework for developing an effective digital library system at the CUR. Survey design was used to carry out the study. The respondents comprised lecturers, librarians, and students. Probability sampling method was used to select respondents from the two campuses with the researcher utilizing systematic random sampling techniques to select sixty respondents. Data for the study was collected through the administration of questionnaires. The study revealed that digital libraries can always be available to everyone since they do not depend on physical boundaries. The study also indicated that content of quality depends on both the capabilities of the librarian and the availability of funds. Findings also revealed that digital content determines the worth of any digital library. The study concluded that developing a digital library is an arduous and complex process which requires competent staff, updated technologies, organized content with quality standards and thorough knowledge of data rights. In order to cope with the fast changing digital resources, the study recommends that users should be trained constantly. Finally, the study recommended that local/internal publications in digital format should be encouraged and promoted in order to be successful and competitive.
CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The expression digital library has a variety of meanings ranging from an electronic digitized collection of materials in the traditional context to the modern services that make that information useful to eventual users. Accordingly, the term digital library implies a managed collection of information, with associated services stored in digital formats and accessible over a network (Kumar, 2012: 175). Digital libraries range in size from tiny to huge and contain diverse collections of information for use by multifarious users. Similarly, digital libraries are described as organizations that provide specific resources. These include 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 (Higher Education Commission (HEC), 2012: 13).

1.1.1 Development of Digital Libraries

The first attempts to store library information on computers date from the late 1960s (Payne & Curtis, 2014: 548). These early attempts faced technical barriers, including the high cost of computers, terse user interfaces, and the lack of networks. The past thirty years have steadily eroded the then technical barriers. During the early 1990s, a series of technical developments took place that removed the last major barriers to building digital libraries (Jan & Sheikh, 2011:
3). Some of this technology is still rough and ready, but low-cost computing has stimulated an explosion of online information services (Bakar, 2012: 138). Four technical areas stand out as being particularly important to digital libraries as highlighted below.

First, the cost of constructing new buildings and maintaining old ones to store printed books and other artefacts will only increase with time, conversely, electronic storage costs decrease by at least 30 percent per annum (Deodato, 2014: 740). Ten years ago, equipment costs were a major barrier to the setting up of digital libraries. As observed by Donnelly (2010), the costs are much lower particularly for storing large objects such as digitized videos, extensive collections of images, or high-fidelity sound recordings (p. 138).

Secondly, until comparatively recently, few people were happy to read from a computer because the quality of the representation of documents on the screen used to be poor. The usual procedure was to print a paper copy. Since then major advances have been made in the quality of computer displays, in the displayed fonts and in the software that is used to manipulate and render information (Saravanan, 2012: 27).

Thirdly, the growth of the internet over the past few years has been phenomenal. Telecommunication companies compete to provide local and long distance internet service across the world; international links reach almost every country in the world; every sizable company has its internal network; universities have built campus networks; individuals can purchase low-cost dial-up services for their homes (Deodato 2014: 739). Conversely, network coverage is not universal and some countries are not yet connected at all, but in many countries it is easier to receive information over the internet than to acquire printed books and journals (Niu, 2014: 175).
Fourthly, digital libraries are based around networks; their utility has been greatly enhanced by the advent of Wi-Fi (wireless) and of portable computers. By connecting a laptop computer to a network, a user combines the digital library resources of the internet with the personal work that is stored on the laptop. In addition, copies of selected library materials can be retained on the user’s computer after network disconnection (Towndrow & Vallance, 2013: 265).

1.1.2 The Catholic University of Rwanda

The Diocese of Butare established the private higher learning institution named the Catholic University of Rwanda (CUR). The university is the latest academic institution of higher learning which began in 2010 in the Southern Province, Gisagara District. The CUR has two campuses; Alex Kagame Campus situated at Save and Taba Campus situated at Taba in Huye District and each campus has three faculties including Science and Technology, Commerce, Public Health and Human Nutrition, Social Work, Education and Religious Sciences. The University provides a four-year training programme that leads to a bachelor’s degree (CUR, 2014).

The major aim of the CUR is to prepare highly qualified and devoted professionals to respond to the problems of the socio-economic development of Rwanda. In this perspective, the major challenge of the CUR is to make available an important number of qualified people in the following domains: science and technology, health and nutrition, commerce, social work, religious sciences and education (CUR, 2014). The cabinet meeting approved the Catholic University of Rwanda as a private university on 15 October 2014. The university library owns some information resources both in print and digital format (CUR, 2014).
1.2 Statement of the Problem

The development of digital libraries has emerged as a new strategy that allows universities to build digital collections to accelerate changes taking place in scholarship and scholarly communication (Adzobu, 2014: 39). With the development of a digital library, there is a possibility to build large-scale services where collections of information are stored in digital formats and retrieved over networks. From a personal computer, the user is able to consult materials that are stored on computers around the world. In addition, the scope of the collections expands beyond the walls of the library. For instance, private papers in an office or in the collections of a library on the other side of the world are as easy to use as materials in the local library. Moreover, the emergence and growth of information and communication technologies and the World Wide Web have enabled libraries to provide quick and easy access to knowledge. Finally, the costs of constructing new buildings and maintaining old ones to store printed books and other artefacts will only increase with time, but electronic storage costs decrease by at least 30 percent per annum. Thus the CUR, as a contemporary academic institution which wishes to remain abreast with the digital age will need to develop an effective digital library infrastructure so as to provide extensive opportunities for academic usage.

1.3 Aim of the Study

The aim of this study was to assess the viability of developing digital libraries in academic institutions with reference to the CUR.
1.3.1 Objectives of the Study

The specific objectives for this study were to:

1. Establish the need for developing a digital library at the Catholic University of Rwanda.

2. Examine the basic requirements for developing a digital library at the CUR.

3. Find out the challenges that will be experienced during the process of digital library development.

4. Suggest a framework for developing an effective electronic library system.

1.4 Research Questions

In order to meet the study objectives, the following questions were used:

1. What are the grounds for developing a digital library at the Catholic University of Rwanda?

2. Which basic elements are required for developing a digital library at the CUR?

3. What are the users’ expectations on the development of a digital library at the CUR?

4. What are the challenges that the CUR may experience during the development of a digital library?

5. What strategies can be adopted in developing a successful digital library at the CUR?

1.5 Assumptions of the Study

1. Digital libraries facilitates access to more extensive collections, improve service provision, enhance resource sharing activities, reduce the need to provide redundant copies, and offer services at lower costs.
2. Digital libraries cannot be developed without adequate content, right people, technology and organization.

3. Digital objects are made available in a cohesive manner, supported by services that are necessary to allow users to retrieve and exploit the resources.

1.6 Scope of the Study

This study focused on the Catholic University of Rwanda. The key respondents were lecturers, students and librarians. The study used questionnaires which were distributed to the respondents. The timeframe of the research was four months.

1.7 Limitations of the Study

The study sample was limited in that only the CUR and few staff (teaching and non-teaching), undergraduate students were used for the study. To make sure that this limitation would not affect the results of the study, the research used open-ended questionnaires to collect in-depth information and to probe for additional pertinent information.
1.8 Significance of the Study

The significance of the study is divided into parts as follows:

1.8.1 Theoretical Significance

The findings of the study may prove useful for developing a framework for the establishment of an efficacious digital library system. The findings may also be useful for ascertaining what basic requirements are needed in the development of digital libraries in academic institutions in Rwanda.

1.8.2 Practical Significance

Since the study may form a basis for further research on the development of digital libraries in academic institutions in Rwanda, its aim is to produce better and more numerous ideas on digital library development. The results of the study may add to the literature on digital library development for the use of students and scholars.

1.8.3 Policy-related Significance

The findings and recommendations of the study may be useful to the digital library development managers of university libraries for identifying efficient ways of carrying out digital library development activities and developing a better collection of development policies.

1.9 Definition of Operational Terms and Concepts

Definition and clarification of operational key or new terms used in the study.
**Academic Institution**

An educational institution dedicated to teaching, formation and research and which allocates academic degrees. An academic institution can provide a broad education of a variety of subjects or be subject-specific and cater to a single field of study.

**Catholic University**

A Private university run by the Roman Catholic Church and Roman Catholic organizations such as religious institutes.

**Data**

The information stored in a digital library can be divided into data and metadata. Data is a general term to describe information that is encoded in digital form. Whether the word "data" is singular or plural is a source of contention. This project treats the word as a singular collective noun, following the custom in computing.

**Digital Library**

A collection of digital objects that can include text, visual material, audio material, video material, stored as electronic media formats (as opposed to print, micro form, or other media), along with means for organizing, storing, and retrieving the files and media contained in the library collection.
**Digital Library Development**


**Digital Object**

This is used to describe an item as stored in a digital library, typically consisting of data, associated metadata, and an identifier.

**Digital Repository**

An online, searchable, web-accessible database containing works of research deposited by scholars, the purpose of which is both increased access to scholarship and long-term preservation of documents.

**Metadata**

A structured information that describes, explains, locates or otherwise makes it easier to retrieve, use or manage an information resource.

**Private Institution**

An educational institution controlled by a private individual(s) or by a non-governmental agency, usually supported primarily by other than public funds, and operated by other than publicly elected or appointed officials.
Scholarly Works

Research, literacy, performed, and fictional works in various formats produced by academics.

Viability

A noun that means the quality of being able to happen or having a reasonable chance of success. Viability comes from the Latin root vita, meaning "life." So the noun viability also refers to something's capacity to live and grow.

1.10 Chapter Summary

This chapter discussed the background of the study which consists in a historical overview of digital libraries and of the Catholic University of Rwanda library. The chapter also provided the problem of the study, the purpose and objectives of the study and even its assumptions. Further, this chapter gave the scope, limitations and significance of the study. Finally, it presented the meaning of some operational terms and concepts.
CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Literature review is the process of reading, analyzing, evaluating, and summarizing scholarly materials about a specific topic (Nordquist, 2011: 5). Four key outcomes of doing literature review include assessment of the current state of research on a topic, identification of the experts on a particular topic, identification of key questions about a topic that need further research and determination of methodologies used in past studies of the same or similar topics (Nordquist, 2011: 5). This chapter reviews the literature available on the process of developing a digital library. The chapter further provides details on digital information and libraries, the rationale for developing digital library, the basic requirements in developing digital libraries, the challenges to be faced and the empirical and intellectual studies are analysed. Finally, it draws out the conceptual framework for the study and a summary of the chapter.

2.2 Digital Information and Libraries Background

The development of digital library in library practice had been predicted by Vannever Bush in 1945, who envisioned a device which he called the ‘memex,’ a mechanized system based on microfilm technology which would be able to store large amount of books, records, and communication, with the ability to be consulted and retrieved with exceeding speed and flexibility (Isah, Serema, Mutshewa & Kenosi, 2013: 2). This prediction was further made clearer by Licklider in 1965 in Libraries of the Future, where it demonstrated future roles of
computer and digital technologies in the development of library practice. Licklider envisaged a future library system that would extend further into the process of generating, organizing, and using knowledge with the application of digital technology (Isah et al., 2013: 2).

Introduction of the web also was a base phenomenon for the establishment of digital libraries. The web is a library without a card catalogue, and many search tools or services were crude at the early stage (Khan & Ahmed, 2013: 14). In 1989, the World Wide Web project was first proposed and, it quickly grew at an exponential rate that was referred to as true digital library. The networked information system and WWW have introduced new and powerful tools and directions for storing, finding, retrieval and sharing of information. High levels of attention and funding were first given to digital libraries in early and mid 1990s, which led to a booming era with a large number of visions and projects. Scholars in the field wanted to find ways to apply or create technologies in order to better use and share information on the network systems that were developing at an amazing speed.

2.3 Rationale for Developing Digital Libraries

Scholars (Norouzi & Nadjila (2011); Saravanan (2012); Niu (2014); Griffis (2014); Navid Fatemeh & Bidyut (2013)) associate digital libraries with the following potential benefits:

Foremost, a digital library brings the information to the user's desk, either at work or at home, making it easier to use and hence increasing its usage. With a digital library on the desk top, a user need never visit a library building. The library is wherever there is a personal computer and a network connection (Saravanan, 2012: 27).
Besides, in most aspects, computer systems are already better than manual methods for finding information. They are not as good as everybody would like, but they are good and improving steadily. Computers are particularly useful for reference work that involves repeated leaps from one source of information to another (Niu, 2014: 187).

Also, libraries and archives contain much information that is unique. Many digital libraries or electronic publications are maintained at a single central site, perhaps with a few duplicate copies strategically placed around the world. This is a vast improvement over expensive physical duplication of little used material, or the inconvenience of unique material that is inaccessible without travelling to the location where it is stored (Griffis, 2014: 25).

In addition, many libraries provide online the text of reference works, such as directories or encyclopaedias. Whenever revisions are received from the publisher, they are installed on the library's computer. The new versions are available immediately. Keeping information current is much less of a problem when the definitive version is in digital format and stored on a central computer (Norouzi & Nadjila, 2011: 699).

Moreover, the doors of the digital library never close. A recent study at a British university found that about half the usage of a library's digital collections was at hours when the library buildings were closed (Niu, 2014: 188). This means that materials are never checked out to other readers, miss-shelved or stolen. Another advantage of the digital library is that the scope of the collections expands beyond the walls of the library. Private papers in an office or the collections of a library on the other side of the world are as easy to use as materials in the local library.
Finally, most of what is stored in a conventional library is printed on paper, yet print is not always the best way to record and disseminate information (Navid, Fatemeh & Bidyut, 2013: 553). For instance, a database may be the best way to store census data, so that it can be analyzed by computer.

2.4 Basic Requirements in Developing Digital Libraries

The following section discusses the requirements necessary for developing digital library including content, people, systems, data rights, standards among others.

2.4.1 Content

For users, content is the most interesting and valuable aspect of a digital library, while, the core function of any library is dissemination of the right content to its community. The dissemination of content, in traditional libraries, comes in the form of physical objects such as books, journals, and audio and video tapes. These physical objects are integrated into digital libraries either through conversion or creation of newborn digital objects of the old content. Digital objects also come in different formats such as data sets (for example: a table of results), or multimedia information (an image, graphic, animation, sound, musical performance, or video) (Henry, 2012: 2). Digital library content, just like the practice in the traditional library where content is catalogued and shelved for easy access, is also catalogued in the form of metadata and managed in the digital repository for easy accessibility.
2.4.2 Right People

Any organization that intends to establish a digital library must have a sustainable arsenal of suitably knowledgeable and skilled staff. People are the most important digital library’s resource, not only during its initial creation and set up, but also for its operation, maintenance and provision of services. The human elements of digital libraries make decisions about content, design, and modification of organizational structures (Naid, Fatemeh and Bidyut, 2013: 554). Categories of people in the domain include librarians, repository managers, and system administrators. The librarians select the content they are interested in making available based on the mission of the parent institution. In addition, librarians assist end-users with searching techniques that facilitate easy usage of digital libraries. In the same vein, the repository managers may adopt policies that implicitly select the digital objects that can be deposited into the repository. The system administrators maintain the index server and select the digital objects that are indexed in the server (Tibenderana, 2010: 36). Above all, system administrators must be sympathetic persons and conversant with the information needs of the clientele they serve.

2.4.3 Usable Systems/Technology

Most digital libraries are made available over the internet through web technology, though, strictly speaking, this is not a necessary attribute of a digital library. However, as the advantages of the web are so great, most library systems today are designed to be web-accessible. The most successful web site designs account for a number of factors, including the technical differences among computers and browsers, speed of access, and differences among users and web navigation preferences. Browsers differ in the way they display information, even though they
use the same basic communication protocols and standard markup. Since users may change default settings, including font size and other parameters, it is always preferable to create as simple an interface as possible and avoid server-side control of the exact display of the data. Providing multiple access points not only makes a digital library more interesting, it also acknowledges the differences among its potential users. Accessibility for users with a range of physical disabilities should also be a concern when developing the interface of a digital library (Ayanbode, 2011: 214).

2.4.4 Open Access

The Scholarly Publishing and Academic Resources Coalition (SPARC) (2014: 1) defines Open Access as the free, immediate, online availability of research articles, coupled with the rights to use these articles fully in the digital environment. Open access is very important because it accelerates research, enriches education, shares learning among rich and poor nations and enhances return on taxpayer investment in research. One way to ensure open access to content is to avoid proprietary hardware and software solutions whenever possible. While it may be reasonable to create content using commercially available systems and tools, it is necessary to avoid use of special software or hardware to access that content (Khan & Ahmed, 2013: 19). For continued accessibility and use, open, nonproprietary systems are preferred.

2.4.5 Data Rights /Intellectual Property and Privacy

An obstacle threat to open access to information occurs as a result of intellectual property restrictions. Existing intellectual property and copyright law provide economic and legal protection to publishers of physical artifacts. Those developing digital libraries need to be aware
of the issues, participate in the public debates about their resolution, and establish procedures to manage them in order to protect their collections to the extent possible (Greenstein, 2010: 124). For example, in conversion projects, every attempt should be made to seek permission from the copyright owner for the materials that are to be digitized. Privacy issues should also be considered when the full papers of a prominent individual are being digitized. Ideally, the donor will have marked the items that are sensitive in some way and left instructions about how they should be handled. In all cases, however, careful tracking of permissions and privacy information ensures the collection will not be at risk of litigation at some future time.

2.4.6 Automate Whenever Possible

Because developing a digital library requires significant intellectual effort on the part of the system’s creators, the more automated tools that can be built and used, the better will be the use of precious human resources. United Nations Educational, Scientific and Cultural Organization (UNESCO) (2011: 5) specifies that these tools need to be easy to use and incorporate real-time aids including data validation, pull-down lists, report generation, and other time-saving devices, thereby allowing the content experts to concentrate on the intellectual tasks at hand.

Content experts use the metadata entry system to add metadata to a master database, entering the information only once. As a result, entering the data only once saves human time and effort, reduces the error rate, and allows maximum flexibility (Khan and Ahmed, 2013: 23). Such a system is designed to be modular, allowing existing modules to be modified easily and new modules added for additional functionality.
2.4.7 Standards

The use of standards in system building has many benefits. Applications are more readily scalable, interoperable, and portable; these characteristics are all important for the design, implementation, and maintenance of digital libraries. Using standards is especially important for the aspects of digital libraries that are most labor intensive (Ayanbode, 2011: 217). Scanning, metadata entry, and document markup, all involving the evaluation and handling of individual items in a collection, are resource intensive and best done carefully and only once. Data might still have to be migrated to other forms and formats in the future, but migration will be easier, if standards have been used consistently. Images scanned using standard file formats, such as tagged image file format (TIFF), or texts saved in the open American standard code for information interchange (ASCII) or Unicode format will be more easily accessible in the future than images or texts encoded in proprietary formats. Delivering the contents of the digital library on the web, using standard, valid, and current hyper text mark-up language (HTML), including metadata tags, and other standard web technology, increases the chances that other web search engines will be able to find the library, as well as the specific items in it (Khan and Ahmed, 2013: 27).

2.4.8 Quality

Quality metrics can be applied to all the processes and outcomes involved in developing a digital library. They are relevant to selection, metadata entry, image capture, and the overall usability of the system. Complete and correct metadata yields many benefits; incomplete or incorrect metadata affects the quality of the entire digital library. Metadata plays a vital role not
only in resource discovery but in managing the collection. If, for example, subject codes are applied haphazardly or incorrectly, access could be more difficult, and attempts to generate or browse hierarchies based on these codes could be foiled. Some quality-control metrics can be automated; others require careful human review (Khan and Ahmed, 2013: 29). Digital library projects should define and then carry out quality-control methods as part of their normal procedures. Adhering to such methods ensures that quality assessment becomes an integral part of building and maintaining a digital library.

2.4.9 Persistence / Maintenance and Accessibility

A digital library must have some form of preservation mechanism. In that way, there has to be a means of ensuring that what may be available today is still available tomorrow. Persistence implies a commitment to both maintaining the object and keeping it accessible (Rothenberg, 2012: 15). Several suggestions have been made by researchers to address preservation of digital objects. Perhaps the one discussed most often is the “migration strategy,” which entails the transformation of data from one file format to another, converting it from one software environment to another, or moving it from one physical medium to another. Migration implies a strong and enduring commitment on the part of an institution to continually refresh its collections to keep up with the technology. Another proposed method is the “emulation strategy,” which involves the emulation of an entire software system so it runs on future unknown systems (Khan & Ahmed, 2013: 30).
2.4.10 Sustainable Funding

Digital librarians need to establish the financial wherewithal to pay for and sustain digital libraries. One can unequivocally declare that finding a way to fund digital libraries is the single most frustrating obstacle facing librarians in the present day. Digital libraries are bound to change the social system by which information is collected, transformed, managed, disseminated and preserved, both in the present day as well as in the future. Libraries will most certainly be at the helm of actualizing that phenomenon and therefore it is imperative that they strive to build sufficient capacity, in terms of financial backing (Tibenderana, 2010: 45). This means that digital librarians must also be reasonably adept in the dual skills of fund-raising and fund management if at all their libraries are to survive in the medium and long term.

2.5 Challenges Involved in Setting up Digital Libraries

The establishment of a digital library system is difficult, expensive and a long-term process. Particularly in developing countries like Rwanda, the process poses serious challenges.
<table>
<thead>
<tr>
<th>Issues</th>
<th>Aspects Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legal</td>
<td>Copyright, contracts and privacy.</td>
</tr>
<tr>
<td>Financial</td>
<td>Financial resources and changes to funding allocation.</td>
</tr>
<tr>
<td>Client</td>
<td>Client needs, client attitudes and resistance to introduction of new technologies.</td>
</tr>
<tr>
<td>Personnel</td>
<td>Staff commitment to new systems and services, changed staff training and competencies and effect of automation on staff skilling and professionalization.</td>
</tr>
<tr>
<td>Organizational</td>
<td>Need for new organizational structures, reorganization of hierarchies and work divisions, organizational size, balance between professional and paraprofessional staff and appropriate position levels.</td>
</tr>
<tr>
<td>Management</td>
<td>Strategic planning, need for new or different performance measures, organizational support and leadership, need for champions within the organization and appropriate statistical measurement.</td>
</tr>
<tr>
<td>Technological</td>
<td>Security, infrastructure development, use of appropriate technologies and standards.</td>
</tr>
<tr>
<td>Collaboration</td>
<td>Resource sharing, cooperative purchasing of information resources and cooperative purchase or development of hardware and infrastructure.</td>
</tr>
<tr>
<td>Digital Content</td>
<td>Availability of content for different disciplines and appropriateness of and Collections delivery method.</td>
</tr>
</tbody>
</table>

*Source: Adapted from Kumar (2012: 3-6).*
When grouped together, these challenges all fall within nine interlinked subject categories, as shown in table 1 above. The following sections highlight these categories of challenges.

2.5.1 Legal Issues

Legal issues include copyright, contracts and privacy. The vision for digital libraries includes fluid, easy access to a wide variety of materials. This is often in conflict with the duties of libraries and archives entrusted with care and management of materials that may be subject to privacy rights or other needs for security. Khan and Ahmed (2013) assert that efforts to formulate digital libraries will be delayed or frustrated in the absence of a common, responsible framework of rights, permissions, and restrictions that acknowledges the mutual needs of rights-holders and users of materials in digital libraries (p. 35).

2.5.2 Financial Issues

Financial issues refer to financial resources and changes to funding allocation. The creation and maintenance of digital libraries is very expensive. Costs are incurred for production, for ongoing provision of access, and for preservation of digital information. The cost to develop and operate a distributive architecture for long-term archiving, migration, and backup of digital materials will be high. Kumar (2012: 7) observed that since the resource is spread among providers, the net cost tends to be disguised. Libraries would benefit from better estimates of costs and trends in cost for production and maintenance of a corpus of digital information.
2.5.3 Client Issues

Client issues comprise client needs, client attitudes and resistance to the introduction of new technologies. In order to develop serviceable digital libraries and to improve system design, a thorough evaluation needs to be carried out on who the users are and on what their preferences and capabilities are in terms of their being able to customize the interface. Their choices need to be gauged in relation to how this will affect the overall rate of retrieval results.

2.5.4 Personnel Issues

Personnel issues imply staff commitment to new systems and services, altered staff training and competencies and impact of automation on staff skilling and professionalization. Khan and Ahmed (2013: 27) affirm that digital libraries depend on people and cannot be introduced at a faster rate than people and organizations can keep up with. This applies equally to the creators, users and the professionals who support them. The relationships amongst these groups are changing. With digital libraries, readers are more likely to go directly to information without visiting a library building or having any contact with a professional intermediary. Authors carry out more the tasks of manuscript preparation by themselves. Professionals need new skills and new training to support these new relationships.

2.5.5 Organisational Issues

Organisational issues entail need for new organizational structures, reorganization of hierarchies and work divisions, organisational size, balance between professional and paraprofessional staff and fitting hierarchical levels. Since established organisations have difficulties changing rapidly many exciting developments in digital library have been introduced by new organizations. New
organisations can begin afresh, but older organizations are faced with the problems of maintaining old services while introducing the new. Kumar (2012: 8) affirmed that the likely effect on digital libraries will be a massive transfer of money from traditional suppliers of information to new information entrepreneurs and to the computing industry. Naturally, existing organisations will try hard to discourage any change in which their importance diminishes. Some important organisations will undoubtedly shrink in size or even go out of business. Predicting these changes is made particularly difficult by uncertainties about the finances of digital libraries and electronic publishing, and by the need for the legal system to adapt. Eventually, the pressures of the marketplace will establish a new order.

2.5.6 Management Issues

Management issues are related to strategic planning, need for new or different performance measures, organisational support and leadership need for champions within the organisation and appropriate statistical measurement. When a new and old technology compete, the new technology is never an exact match. Typically, the new has some features that are not in the old, but lacks some basic characteristics of the old. Therefore the old and new usually exist one another. However, IFLA/UNESCO (2011) indicates that the spectacular and continuing decline in the cost of computing with the corresponding increase in capabilities sometimes leads to complete substitution. Word processors were such an improvement that they supplanted typewriters in barely ten years. Card catalogs in libraries are on the same track. In 1980, only a handful of libraries could afford an online catalog (Massis, 2014: 497). Twenty years later, a card catalog is becoming a historic curiosity in American libraries. In some specialized areas, digital libraries may completely replace conventional library materials.
2.5.7 Technological Issues

Security, infrastructure development, use of appropriate technologies and standards; these are technological issues. If digital technology is so splendid, what is stopping every library immediately becoming entirely digital? Part of the answer is that the technology of digital libraries is still immature, but the challenge is much more than technology. An equal challenge is the ability of individuals and organizations to devise ways that use technology effectively, to absorb the inevitable changes, and to create the required social frameworks. Griffis, (2014) observes that the world of information is like a huge machine with many participants each contributing their experience, expertise, and resources. To make fundamental changes in the system requires inter-related shifts in the economic, social and legal relationships amongst these parties.

2.5.8 Collaboration Issues/Interoperability

Table 1 above indicates what collaboration issues are in regards with resource sharing, cooperative purchasing of information resources and cooperative purchase or development of hardware and infrastructure. Interoperability is one of the most heavily discussed issues in digital library research. The requirement for interoperability derives from the fact that various digital libraries with different architectures, metadata formats and underlying technologies wish to interact effectively, something they can only do through applying common protocols and standards.

The Open Archives Initiative (OAI) is the most widely discussed and investigated standard for cross-repository interoperability. It allows distributed digital libraries to expose their metadata
to a wider range of search and retrieval services as well as to extract metadata from Web databases.

2.5.9 Digital Contents and Collections Issues

In this category there are challenges associated with digital content: for instance conversion of printed materials into digital format and the creation of digital-only materials for the purpose of a particular digital library. In addition, a host of other issues related to digital content and collections have to be taken on board. These include: collection development strategies, policies and management; identifying collections of information which are not accessible or usable because of technical barriers; formulating strategies for sustainable and scalable collections; encouraging the development of new collections; the creation of digital objects and electronic publishing; the creation of new genres of digital objects; and issues related to digital preservation and finally, web archiving.

To sum up, research in digital libraries will span a broad range of subjects, disciplines, contexts and communities in the coming years. This development reflects the fact that digital libraries will function as institutional entities with a key role to play in our social, cultural and educational activities. Collaborative digital work environments, social digital navigation and new forms of digital environments for academic, educational, publishing and recreational purposes can be viewed as significant factors in future developments in digital library research.

2.6 Empirical and Intellectual Studies

A number of studies have been done on developing digital libraries but under different contexts. Mohsenzadeh and Isfandyari-Moghaddam (2011) analysed the difficulties and obstacles for
developing digital libraries in the seven regional branches of Islamic Azad University (IAU), Iran, and also the status of librarians' skills and education programmes at these institutions.

Da Rosa and Lamas (2012) focused on the process used for building a digital library in developing countries with reference to the University Jean Piaget of Cape Verde created in a context of scarce access to printed materials and serious difficulties in accessing ICT resources. The study observes that building such libraries in developing countries is a real challenge. These face several difficulties, such as low computer and internet penetration rates, poor ICT infrastructure, lack of qualified human resources, lack of financial resources, etc. Thus, it is imperative to find alternative mechanisms of building digital library that best fit the specificities of these countries.

Wu, He, and Luo (2012) surveyed academic users in order to identify their needs and expectations about multilingual information processing when these users interact with digital libraries. The authors observe that participants want many multilingual capabilities in digital libraries; and more sophisticated multilingual search interfaces.

Górny and Mazurek (2012) attempted to characterize the dominant groups of Polish digital library users, taking a user's interests as the main determinant. The analysis focused on age, sex, level of education, and size of town where users reside. An effort was also made to determine approximately the total number of users.

Khan and Ahmed (2013) conducted a study on the impact of digital library resources on scholarly communication: challenges and opportunities for university libraries in Pakistan. The study concluded that digital libraries provide effective resources and services to research scholars and also found a significant impact on their research progress at these universities. The
study has identified several problems encountered by respondents in the use of digital library resources and services.

Adzobu (2014) also carried out another study on building digital collections in a public university library in Ghana: priority-setting and user needs assessment. The study noted that academic libraries are increasingly advocating local user studies as a way to provide the digital library services that are relevant to the culture and user population of the academic institution. Furthermore, replicating digital library user studies at the local level can provide information for improving existing services or developing new ones.

2.7 Knowledge Gap

Despite the great effort to underline the importance, challenges and need of digital libraries in different contexts in various parts of the world, none of the researchers have stressed the viability of developing a digital library in academic institutions.
2.8 Conceptual Framework

A conceptual framework was drawn to illustrate the relationship of the dependent variables and the independent variables as shown below.

![Conceptual Framework Diagram]

**Figure 1: Conceptual Framework**
Developing a digital library is a process that requires some basic requirements essential for its development. Some of these elements are considered as independent variables such as content, right people, financial resources, standards, data rights and usable systems, while automation, management and quality are recognized as intervening variables. One needs all these elements combined in order to be successful in developing a practical digital library that can allow accessibility, content sharing and time saving for the users, as well as storage space and visibility for the institution.

2.9 Chapter Summary

This chapter discussed the development of digital information and libraries, and the practical aspects of developing digital libraries. The study also highlighted some of the empirical studies done on digital library development as well as demarcated the knowledge gap on which this study intended to contribute.
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology that was used in undertaking the study. It covered the research design, the target population, the type of data to be collected, sampling frame, sample and sampling techniques, data collection instrument, data collection procedure, pilot test, validity and reliability of the instruments, and data processing and presentation. Lastly, the analytic techniques used for data analysis was presented.

3.2 Research Design

Research design is an arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose (Leedy & Ormrod, 2010: 25). This study employed a descriptive survey design to examine the viability of developing digital libraries in academic institutions with particular reference to the Catholic University of Rwanda. Descriptive survey design was used in preliminary and exploratory studies to allow researchers to gather information, summarize, present and interpret data for the purpose of clarification (Orodho, 2012: 45). This study generally, used quantitative approach. Some qualitative approaches, however, were used in order to gain a better understanding and possibly enable a better and more insightful interpretation of the results from the quantitative study.
3.3 Area of the Study

The study covered both campuses of the Catholic University of Rwanda situated in Huye and Gisagara Districts.

3.4 Target Population

A population is a collection of objects, events or individuals having some common characteristics that the researcher is interested in for the study. A target population however, is a large group from which a small proportion is selected and out of which accurate information can be gathered (Johnson & Christensen, 2011: 34). The target population comprised all staff members (teaching and non-teaching) and all students within the university.

3.5 Sample and Sampling Techniques

Sampling means the selection of a part of group or an entirety (population) with the aim of collecting complete information (Leedy & Ormrod, 2010: 27). A sample refers to a small group of a population that is used to make generalizations of the whole population.

3.5.1 Sampling Techniques

In this study, the researcher used systematic random sampling in order to investigate the viability of developing digital libraries in academic institutions with specific reference to the Catholic University of Rwanda. The systematic random sampling method was selected because it ensures that every element in a target population has a chance of being chosen. This method involves selecting every n\textsuperscript{th} sampling unit from a list of all members of the population under
study. In this instance the researcher decided all practical purposes to limit the number of students to 54 out of the population of 2302. The population number was then divided by that number and this produced the number 43 ((2302 ÷ 54 = 43). Then, a number smaller than 43 was randomly selected (3) and starting from that number, every 43rd name on the students list was included in the study. In this manner, each staff member and student in the target population was given an equal opportunity of being selected.

3.5.2 Sample

The total sample size involved sixty respondents including fifty four students, three lecturers and three administrative staff. The table below shows the sample size.

<table>
<thead>
<tr>
<th>Target Respondents</th>
<th>Total Population</th>
<th>Sample size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative and support</td>
<td>50</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td>Lecturers</td>
<td>106</td>
<td>3</td>
<td>3%</td>
</tr>
<tr>
<td>Students</td>
<td>2302</td>
<td>54</td>
<td>90%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2458</strong></td>
<td><strong>60</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

3.6 Data Collection Methods

There are always three ways of collecting data: the direct method (using interview), the indirect method (using the questionnaire) and the combination of the two (direct and indirect methods) (Johnson & Christensen, 2011: 39). Among these, the researcher used the indirect method. The study used primary data which were gathered through a semi-structured questionnaire
administered by the researcher to facilitate a probing inquiry. The questionnaire had both open and closed ended questions. The questionnaire also utilized a Likert scale in some of the questions which helped in analysis of the data. Questionnaire was used because it was ideal for this study since the target groups were literate and they could provide adequate information in writing. The questionnaire is found in Appendix III.

3.6.1 Questionnaire

Johnson and Christensen (2011:37) define a questionnaire as a “carefully designed instrument for collecting data directly from people.” A questionnaire is a useful tool for quantitative data since it provides responses that can be calculated and tabulated. In addition, each item in the questionnaire is developed to address a specific objective, research question or hypothesis of the study. In this study, a questionnaire was distributed to the respondents selected as a sample population with a request to answer the questions and return the questionnaire to the researcher.

3.6.2 Document Review/ Desk Review guide

This study used both primary and secondary source information. This means that it used the information directly written and posted by its creators on the internet as well as other publications such as traditional textbooks.

3.7 Research Instruments

In this study the researcher was the primary data collection instrument because the data from participants were words in the context of the research problem. This approach allowed greater
latitude in providing answers therefore the respondents were able to provide in-depth information regarding the viability of developing digital library at CUR.

3.7.1 Pilot Study

A pilot study is a kind of testing that can reveal unanticipated problems with question wording, with instructions to skip questions, and so on. And, crucially, it can prove helpful if participants understand the meaning of the questions in the way that the researcher understands them. It can also show how long it takes to complete the questionnaire and as well as be used to identify and eliminate items that will not generate usable data. Finally, the pilot survey asked the respondents to make comments on the design and content of the questionnaire and to make suggestions if possible about more efficient and practical way of administering it (Phellas et al., 2011: 32). The pilot testing was run at the Catholic Institute of Kabgayi, which is another private high learning institution owned by the Catholic Church in Rwanda. The pilot study was administered until the researcher was satisfied that the data collection was duly completed.

3.7.2 Validity

Validity is the degree to which the researcher collects data that reflects the true picture of the phenomenon being studied (Kasalu & Ojiambo, 2012: 26). In measuring the validity, the researcher tested whether the instruments was efficient for collecting credible data. For this purpose, two librarians and some students were given an explanation on the wording of the questionnaire.
3.7.3 Reliability

Reliability is the extent to which a procedure yields the same answer time after time (Kasalu & Ojiambo, 2012: 28). In testing reliability, the researcher was interested in knowing if the chosen instrument would bring consistency in the research. The researcher ensured that the sequence of questions was flowing and the objectives were adequately covered by the questionnaire.

3.7.4 Ethical considerations

The ethical problem in this study was the confidentiality of respondents and integrity of the findings. Some respondents were hesitant about revealing information considered internal to the organization but which was important to the research. To ensure that this would not affect the results of the findings, the researcher ensured that all information was both kept secure and confidential. In addition, the researcher assured respondents that this was being done. The researcher maintained integrity by presenting findings and interpretations honestly and objectively. The researcher also avoided plagiarism by ensuring that any source of information used in the study had been adequately acknowledged. Permission was also sought from the university to collect data from the staff and the students.

3.8 Data Collection Procedures

Data collection is the gathering of specific information to be used in order to prove or refute some facts (Orodho, 2010: 47). The researcher collected the questionnaire just after the respondents filled them. The number of administered questionnaire copies was sixty (60) and all of them were expected to be filled in and returned thus representing (60/60 x100) 100%.
3.9. Data Analysis

This section discussed the techniques used to analyse data and test the variables. Before processing the responses, data preparation was done on the completed questionnaire by editing and entering the data. The data collected was analysed using descriptive statistics. The descriptive statistical tools helped in describing the data and in determining the respondents’ degree of agreement with the various statements under each objective. Data analysis was done using MS-Excel to generate quantitative reports.

3.10 Chapter Summary

This study was carried out using a survey design. This design enabled the researcher to collect in-depth data on views, opinions, practices, and impacts of developing digital libraries in private high learning institutions. Qualitative and quantitative approaches were used to analyse the data. The study population comprised sixty respondents from the Catholic University of Rwanda which were sampled using probability methods. The particular sampling method was selected because of limited size of population as well as because it was thought to be ideal for an in-depth study.
CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION OF FINDINGS

4.0 Introduction

The purpose of the study was to assess the viability of developing digital libraries in academic institutions with particular reference to the Catholic University of Rwanda (CUR). The research was based on four specific objectives which informed the formulation of the questionnaires. The researcher used MS Excel which provided statistical summaries of data analysis in form of tables, charts and frequencies.

4.1 Response Rate

A total of sixty questionnaires were sent out and filled by students and staff of the Catholic University of Rwanda. Out of these, fifty five were completed and returned to the researcher, thereby giving a response rate of 91.5%.
### Table 3: Questionnaires’ Responses’ Rate

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Sample Size</th>
<th>No. of questionnaires returned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecturers</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Librarians</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evening</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Day</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Weekend</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td><strong>55 (91.5%)</strong></td>
</tr>
</tbody>
</table>

The high response rate produced sufficient information out of the research questionnaires for it to be reasonably asserted that the results are representative of what parameters ought to be essential for developing digital libraries in academic institutions.

#### 4.2 Background Information of the Respondents

This section gives participants’ background information. The sample consisted of lecturers, librarians and students of the Catholic University of Rwanda. The respondents who participated in the study were of mixed gender.
4.2.1 Gender of the Respondents

The researcher involved fifteen female and forty male students. To arrive at the figures, the researcher used purposive and stratified random sampling techniques to obtain the samples. According to the findings, 27% of the respondents were female while 73% were male. Figure 2 below indicates the gender outcome of the respondents.

![Gender of Respondents](image)

**Figure 2: Gender of Respondents**

Gender equality ought to be part of organizational staffing diversity policies. Thus, in this respect it would appear that the CUR should consider this factor to allow workers and all students maximize their performance.
4.3 Significance of Developing Digital Library

The first specific objective of the study was to establish the need for developing a digital library at the Catholic University of Rwanda. In this way, respondents were asked to indicate their agreement based on various statements.

4.3.1 Possibility for the CUR to Create a Digital Library

A preliminary question put to all the respondents was whether they believed the process to be possible. The majority (98.2%) of the respondents agreed that the creation of a digital library in the university is feasible. Some reasons given include: easy access to information and the benefits technology expansion. One respondent (1.8%) disagreed however, stating that the cost would be prohibitive while the CUR is still at its initial fundraising stage. Although the researcher agrees that the process can be expensive, once it is established, its maintenance becomes a low-cost research tool and source of information provision.

4.3.2 Basic Reasons for Developing a Digital Library

The first research question sought to establish whether there was a need for a digital library at the CUR. The respondents were asked to show the extent of their agreement using a scale of strongly agree to strongly disagree. Figure 3 summarises all the responses on the need for developing a digital library at the CUR.

The first item stated that digital libraries bring information to the user’s desk. The findings reveal that the majority (67% and 31%) of the respondents agreed with the statement, while 2% disagreed. To have information access today, all what a user needs is a laptop and Internet connection.
The item suggesting that digital libraries are accessible 24/7 was also proposed to the respondents. Figure 3 singles out that 25% strongly agreed, 36% agreed, 33% were neutral, while 6% disagreed. Digital library accessibility does not depend on opening and closing hours. This means that information is available to the user at all times.

Another item noted that digital libraries are not limited in terms of size. The findings indicate that 33% of the respondents strongly agreed, 40% agreed, 23% were neutral, 2% disagreed, while 2% strongly disagreed. In fact, contemporary digital libraries do provide users with access to an increasingly gigantic amount of information.

Regarding the item stating that digital libraries can be accessed from anywhere around the world, the findings show that 76% strongly agreed, while 24% of the respondents agreed. This concurs with one of the characteristics of digital libraries, namely that digital libraries do not depend on geographical boundaries.

The next item required the respondents to express their views on whether information can be shared throughout digital libraries. The findings demonstrate that 66% strongly agreed, 25% agreed while two 9% of the respondents disagreed. In general digital libraries are connected to the internet; this allows contents to be used from different cooperating institutions. Collaboration increases access across diverse collections and extends the capabilities of local cultural heritage organizations through shared experience. Thus, the CUR may consider establishing a digital library also because sharing of information means sharing expenses for this information.

With respect to the item which infers that digital libraries can provide information universally, the majority of respondents either strongly agreed (53%) or agreed (34%), whereas 13% were
neutral. The finding results corroborate that digital libraries are always easily accessible to any authorized users or from open access systems.

The following item noted that in a digital library, information can be easily kept current. The findings indicate that 54% of the respondents strongly agreed, 35% agreed while 11% were neutral. The findings echo Norouzi and Nadjila (2011: 699) who assert that keeping information current is much less of a problem when the definitive version is in digital format and stored on a central computer.

The next item stated that multiple users can access the same information resource at the same time. The findings show that 64% of the respondents strongly agreed, 25% agreed, whereas 11% of the respondents were neutral. In fact, one single digital item can be accessed from several locations by numerous users, simultaneously.

The subsequent item required respondents to give their view on whether students can receive their schooling using distance learning education. Figure 3 reveals that respondents either strongly agreed (60%) or agreed (25%), whereas 15% of the respondents were neutral with the statement. The findings implicate that students can study at different hours of the day any day of the week. This is possible because copies can be instantly accessed and adjusted to the liking of the users.

As to the item which stated that the librarian is in full control of the selection of the digital library materials, figure 3 below demonstrates that 42% of the respondents strongly agreed, 47% agreed, whereas 11% of the respondents were neutral. This necessitates a specialist librarian who needs to handle the tasks of bulk digitization, its storage and access as well as
update digital reference services, organise search co-ordination, and manage the archives. This implies that the CUR will have to ensure their staff are competently trained.

The ensuing item which suggested that there is no physical degradation of the resource due to handling, storage, or vandalism, 53% of the respondents strongly agreed, 29% agreed, whereas 18% were neutral. The major risk to digital objects is not usually physical deterioration but the technological obsolescence of the devices that read them.

As to whether users can find research materials from a single location, all respondents either strongly agreed (76%) or agreed (24%) with the statement. The findings echo Saravanan (2012: 19) who argues that the library is wherever there is a personal computer and a network connection. Therefore, any user can access digital information either at work/University or at home.

Figure 3 below gives a summary of the respondents’ responses on the effectiveness of developing a digital library at the CUR.
4.4 Users’ Expectations

The second research question sought to determine users’ expectations of digital libraries in private institutions of higher learning. The respondents were asked to indicate their opinions
using a scale of strongly agree to strongly disagree. A list of statements was presented before them.

4.4.1 Obtaining Accurate Information in Different Formats

The first item proposed that digital libraries allow users to obtain accurate information in different formats. According to the findings, majority (78%) of respondents strongly agreed while the remaining (22%) agreed.

Table 4: Obtaining Accurate Information in Different Formats

<table>
<thead>
<tr>
<th>Responses</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>43</td>
<td>78</td>
</tr>
<tr>
<td>Agree</td>
<td>12</td>
<td>22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

These findings relate to the fact that today each content item in most digital libraries is provided in multiple formats or versions. The multiple formats exist to serve a variety of users who use diverse operating systems, devices and software.

4.4.2 Able to Share Information with Peer Institutions

Another user expectation proposed was that users could share information with peer institutions. A large number of respondents, 67%, either strongly agreed or agreed (31%), while the remaining respondents (2%) were neutral.
Figure 4: Sharing Information with Peer Institutions

The findings corroborate the fact that libraries are generally collaborative, for instance they freely share expertise, ideas and information for their collective good.

4.4.3 Having Understandable Information

On having information in an understandable language the respondents gave varied responses. Figure 5 illustrates that 7% of the respondents strongly agreed, 22% agreed, while 71% were neutral.

Figure 5: Having Understandable Information
User feedback in this respect is essential in order to find out the causes behind communication difficulties. For instance, some of the problems may be linked to computer literacy rather than to linguistic barriers.

**4.4.4 Never Visit a Library Building again**

On never visiting a library building again as a user expectation, the findings demonstrate that the majority of respondents (80%) strongly agreed while 20% agreed indicating that a digital library at the CUR would replace the conventional one.

**Figure 6: Never Visit a Library Building again**

Digital libraries remove the problem of distance, as users do not need to travel to geographical locations to access the information they need. The researcher, however, still thinks that some people will still want to use a physical library, either to second-check information or because it is convenient to them.
4.4.5 Being aware of User Needs

The last proposed user expectation was that the user expects the management of the digital library at the CUR should consider different users’ needs. The findings reveal that the majority (75%) of the respondents strongly agreed and 20% agreed whereas 5% of the respondents were neutral.

Figure 7: Being aware of User Needs

The user needs are concerned with (i) content description, quality and reliability, management and accessibility; (ii) information about user technology, document and information access technology as well as system structure technology; and finally (iii) what they are interested in, their purposes and their way of seeking for information.
4.5 Basic Requirements for Developing a Digital Library

The process of developing digital libraries involves key requirements: content, people, systems, data rights, standards among others. In order to answer the third research question concerning the basic elements required for developing a digital library at the CUR, ten statements were proposed to the respondents. They were asked to indicate their preferences using a scale of strongly agree to strongly disagree. Their responses are summarized in figure 8 below.

4.5.1 Competent Staff

The study sought to establish whether competent staff is a major element for developing a digital library. The findings indicate that the majority (93%) strongly agreed or agreed (7%). Although, librarians at the CUR are probably not going to be the agents of information delivery, they still will need to be the agents of information selection. Digital librarians need a clear understanding of digital technology and its possibilities to participate in creative digital library solutions. They should offer services tailored to the needs of the users. Thus, digital library managers need to have both information management and information technology skills.

4.5.2 High Quality Content Collection

The study sought to find out whether a high quality content collection would be among the basic requirements for developing a digital library. The findings point out that 89% of the respondents strongly agreed while 11% agreed. From the vast quantities of material obtainable at large, libraries have to select what a university specifically requires and to point users in the right direction. Thus the CUR digital library needs to ensure that the information provided is relevant to the needs of multifarious users.
4.5.3 User Friendly Organised Content

The study sought to find out whether user friendly organised content is also a desired component for developing digital libraries. In this respect, 85% of the respondents strongly agreed, 9% of the respondents agreed whereas 6% were neutral. The findings imply that materials should be organised according to users preferences rather than how librarians see fit. In addition, the CUR librarians should endeavour to provide user support for searching and acquiring information.

4.5.4 Technology to Access Other Web Systems

On technology to access other web systems as a component for developing a successful digital library, 75% of the respondents strongly agreed, while 25% agreed and 5% strongly disagreed. The internet has opened the door to real time access to resources located throughout the world maintained by numerous libraries, vendors and consortia. This information often resides in constantly changing databases outside the control of the library staff. Therefore, the library needs to enable the user to access these resources.

4.5.5 Provision of Networks such as the Internet and Intranet

From the findings 60% of the respondents strongly agreed, 29% of agreed, 9% were neutral whereas 2% disagreed with whether provision of networks is an essential requirement for developing digital libraries. The role of librarians in facilitating intranet and internet solutions is key. Since librarians are in regular contact with both system staff and users, they are in a position to coordinate both in order to provide the best services possible.
4.5.6 PCs/Servers

From the findings 58% of the respondents strongly agreed, 27% agreed while 15% were neutral on whether PCs/Servers are indispensable in the development of digital libraries. These technologies might include open source Apache Web Server, web scripting languages, relational databases and other general purpose tools for storing, searching and manipulating information. For their smooth running, libraries need enabling technologies for developing integrated digital library services. Furthermore, they will need personnel skilled in web technologies for organizing electronic resources and delivering these to the users.

4.5.7 Web Authoring Languages

The study sought to find out whether web authoring languages are also needed components for developing digital libraries. Thirty respondents (55%) strongly agreed, eighteen (33%) agreed, four (7%) were neutral, and three (5%) respondents disagreed. An authoring language is a programming language used to create tutorials, computer-based training courseware, websites, CD-ROMs and other interactive computer programs.

4.5.8 Internet Connectivity

As regards the item which proposed internet connectivity as another prerequisite for developing digital libraries, forty three (78%) of the respondents strongly agreed, ten respondents (18%) agreed, whereas two (4%) of the respondents were neutral. Connectivity is more than internet access. With growing demand for online information, academic institutions, including the CUR, are required to provide their users with locations where they can meet their online information
needs. These places must be stable, permanent, with skilled staff to provide training and support, particularly for students who have not previously used the internet.

4.5.9 Being aware of Standards of Practice

The following item noted that before developing a digital library, there should be awareness of current standards of practice. The findings indicate that 49% of the respondents strongly agreed, 42% agreed, 2% were neutral, 5% disagreed, while 2% strongly disagreed. Digital libraries have to conform to commonly agreed standards and protocols to improve world-wide knowledge dissemination and access. According to United Nations Educational, Scientific and Cultural Organization (UNESCO) (2011: 5), standards of practice are: trained personnel, adequate buildings and facilities, integrated planning for libraries and archives, funding and target setting.

4.5.10 Assurance of Sustainable Funding

The last item proposed assurance of sustainable funding as another prerequisite in the development of digital libraries. The findings discover that 85% of the respondents strongly agreed, 11% agreed, whereas 4% were neutral. A major worry is the funding for regular refreshing. Digital preservation is an ongoing operation, requiring a regular future expense. Conversely, every few years the capacities of storage devices increase, whilst their overall costs decrease. Therefore, if a library can manage to fund the first refresh cycle over five to ten years, it can expect that the next refresh cycle will be considerably cheaper.
4.6 Challenges in Developing Digital Libraries

Digitization of library resources poses challenges to the major stakeholders such as the library management, employees and library users. The fourth research question of the study sought to find out the challenges that would be encountered during the process of digital library development. Ten items were proposed to the respondents. These are represented in figure 9 below.
First of all the respondents were asked whether they thought unavailability of funds was a challenge to the development of digital libraries. The findings reveal that 80% of the students, 2/3 of the lecturers and all the librarians agreed. Most academic libraries face unrealistic budgetary demands. Astute management of the financial pressures inherent in the overall budget is crucial. For instance, one has to juggle with funding the digitization exercise as well as the conversion programmes.

Retrospective data conversion was singled out by 69% of the students and one librarian as one of the challenges in developing digital libraries. In order to build a comprehensive resource, historical materials in analogue form (e.g., books, journals, laboratory records, sound recordings, manuscripts, photographs) need to be converted. This process is time consuming and therefore costly. Nonetheless the CUR will have to enter this into its priority list.

Management of digital content was another challenge for developing digital libraries. The findings show that 76% of students, 100% of lecturers and 67% of the librarians were in accord. In fact, masses of information are available at one’s fingertips. As the amount of available data grows, the problem of managing the information becomes more difficult, which can lead to information overload. There are two approaches for solving this, namely, improving methodology of seeking data and adoption of mechanized ways of filtering the data collected.

The next challenge was the low digital and information literacy rates. The findings reveal that 77% of the students, 100% of the lecturers and 67% of the librarians concurred. Digital literacy (the ability to use information and communications technology such as computers and the internet) underpins a nation’s capacity to provide individuals and groups with equity of access to social opportunity, and is a necessity for participation in the digital economy.
The next item proposed as a challenge for developing digital libraries was technical support and security. The findings reflect that 78% of the students and 2/3 of lecturers and librarians agreed with this proposition. The findings infer that successful digital library development benefits from institutional, technical and administrative support offered by the parent organization. In addition, the interfaces should be user friendly, so that users can search for information with ease.

The findings indicate that the great majority of the respondents agreed that lack of essential equipment is a challenge to the development of a digital library: 65% of students, 100% of lecturers and 2/3 of librarians. Essential equipment refers to computers, scanners and servers with adequate storage capacity. This type of equipment is expensive and the costs of its maintenance and upgrading need to be included in the overall budget.

As to the question relating to editing of digitized works, the majority (82%) of the students, 33% of lecturers and 67% of librarians singled this out as being among the challenges in developing digital library. Not all electronic copies of documents will suit the application formats; hence this needs to be taken into consideration during conversion or digitization exercises.

The findings indicate that the majority of the respondents agreed that resistance to change is a challenge to the development of digital libraries, in effect, 88% of students and 67% of both lecturers and librarians. Library staff may fear that success of the project may adversely affect their jobs and those who are not computer literate may not be willing to adjust. Since these are legitimate concerns, it is incumbent upon the CUR library management to educate them to ensure of a smooth transition.
Then the respondents were asked whether they thought availability of content from different disciplines was a challenge to the development of digital libraries. The majority thought so: 94% of students and 67% of both lecturers and librarians. This will not pose a challenge if institutional presentations of research are compatible with the general standards (description, indexing, and access) adopted by other universities.

Staff training was another identified challenge for developing digital libraries. The majority (100%) of students and 67% of lecturers and librarians approved. Staff training is very expensive and requires adequate planning and monitoring. Given that the major problems arise from lack of technical-know-how, most digitization projects often run into problems. Therefore, the CUR has to design appropriate training programmes for its staff.

In summary, the findings reveal that all propositions were selected. This indicates that all the proposed statements were relevant and would likely present challenges in developing a digital library at the CUR. All the statements and their scores are represented in figure 9 below.
Figure 9: Summary of the Challenges in Developing Digital Libraries

Figure 9 indicates that the responses vary according to the categories of respondents. This means that students, lecturers and librarians have different challenges due to their needs and aspirations.
4.7 Strategies for Developing Digital Libraries

The researcher sought to establish strategies for developing an effective library system. A list of strategies was presented to the respondents. They were asked to give their views using a scale between strongly agree and strongly disagree.

4.7.1 Careful Staff Training and Recruitment

The first item proposed that careful staff training and recruitment might bring about an effective library system. According to figure 10 below (66%) of respondents strongly agreed while the remaining (27%), either agreed or were neutral (7%).

![Pie chart showing responses to Careful Staff Training and Recruitment]

Figure 10: Careful Staff Training and Recruitment

Organizational staff is the backbone of any institution. Careful staff training and recruitment would be a must for the CUR because they would help maintain and retain existing skills; scrutiny with respect to irregular recruitment would also need to be practised.
4.7.2 Management Support and Empowering

Another strategy proposed is whether management support and empowering might contribute to the development of an effective digital system at the CUR. The majority of the respondents (82%) either strongly agreed or agreed (14%), while the remaining respondents (4%) were neutral.

![Management Support and Employees Empowerment](image)

**Figure 11: Management Support and Employees Empowerment**

Having empowered employees is the dream of every leader. All managers want people who show initiative by taking on and completing tasks with little guidance. Of course, the expectation is that these people will perform only in ways consistent with company objectives and values. Greenstein (2010: 123) proposed the following for empowering employees: fostering open communication, rewarding self improvement, encouraging safe failure, providing plenty of context, clearly defining roles, requiring accountability, supporting their independence and appreciating their efforts.
4.7.3 Integrating Access to both Digital and Physical Materials

On integrating access to both digital and physical materials, the respondents gave a range of responses. Table 5 shows that 47% of the respondents strongly agreed, 36% agreed, while 15% disagreed and 2% strongly disagreed.

Table 5: Integrating Access to both Digital and Physical Materials

<table>
<thead>
<tr>
<th>Responses</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>26</td>
<td>47</td>
</tr>
<tr>
<td>Agree</td>
<td>20</td>
<td>36</td>
</tr>
<tr>
<td>Disagree</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

United Nations Educational, Scientific and Cultural Organization (UNESCO) (2011:5) observed that intellectual descriptions of originals and reproductions should be presented in a fully integrated way. The same source explains that during the current experimental period, however, many digitization efforts are disconnected from traditional library services. Even when appropriate catalogue records exist, digital content may fail to connect to potential users because individual items in digital collections cannot be retrieved directly or are not identified appropriately to support links from traditional catalogues or bibliographic indexes.
4.7.4 Adherence to Standards and Data Rights from the Beginning of the Process

The next proposed strategy was adherence to standards and data rights from the beginning of the process. Findings reveal that 62% of the respondents strongly agreed and 31% agreed while 7% were neutral.

Figure 12: Adherence to Standards and Data Rights from the Beginning of the Process

The study infers that efforts to formulate digital libraries would be delayed or frustrated in the absence of a common, responsible framework of rights, permissions, and restrictions that acknowledge the mutual needs of rights-holders and users of materials in digital libraries (UNESCO, 2011: 4). A key element for digital libraries, is meticulous recognition and protection of legal rights such as copyright, publicity, privacy, matters of obscenity, defamation, intellectual property protection as well as less legalistic but serious concerns associated with the ethics of sharing or providing access to folk or ethnographic materials.
4.7.5 Encouraging Local Publication by both Students and Lecturers

Lastly, on whether encouraging local publication by both students and lecturers should be required in order to develop an effective digital library system, the findings indicate that most respondents either strongly agreed (74%) or agreed (24%) whereas 2% of the respondents were neutral.

Table 6: Encouraging Local Publication by both Students and Lecturers

<table>
<thead>
<tr>
<th>Responses</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>41</td>
<td>74</td>
</tr>
<tr>
<td>Agree</td>
<td>13</td>
<td>24</td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Local publication consists of electronic theses and dissertations. The use of digital libraries makes theses and dissertations much more available and, for this reason, much more visible. Besides being results of higher education, these works are reference materials which can prove useful to other students.
4.7.6 Additional Strategies for Developing a Successful DL at the CUR

Respondents were asked to suggest any other strategies which might help to bring about a successful university digital library. Suggestions were given by 32 out of 55 respondents (lecturers, librarians and students).

Table 7: Ratio of Responses

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Sample Size</th>
<th>No. of Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecturers</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Librarians</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evening</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Day</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Weekend</td>
<td>25</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
<td>32 (58%)</td>
</tr>
</tbody>
</table>

The findings reveal that out of three lecturers, two respondent-lecturers suggested the establishment of a high quality internet connection and the commitment of senior managers.

The librarians unanimously concurred that in order to establish a successful digital library the CUR administration should secure sufficient funding, establish a good internet connection, deliver updated information and the capacity to store it and provide training programmes.

Out of fourteen respondents of the day students ten suggested the following requirements: a digital library should be available anytime; network connection must not be periodic; the number of computers should match the number students requiring them; visits to other
institutions with developed digital libraries in order to learn from them; employment of expert staff, appropriately remunerated; Instruction on the use and implication of digital libraries.

Out of ten evening program students, five gave the following suggestions: library must have diverse materials in different languages; materials in the library must be constantly updated; the management of digital contents needs to be relevant; library should be opened 24/7; information storage should be modernised, permanent and secure.

Out of twenty five of the weekend students twelve (or 48\%) suggested that: the CUR should be able to share information with other universities; establish stronger internet connection; sustain financial funds by negotiating governmental financial support; train and deploy salaried technicians, provide enough computer rooms; sensitise students and staff about the use of digital library and encourage students to use the new system. The respondents also suggested that other universities which have developed digital libraries should be investigated and reported upon, and finally, that librarians should be alert to developments in the field and update accordingly.

Lecturer-respondents stated that a good reliable internet connection is a basic requirement when setting up a digital library. In addition, this is only possible if senior management is aware of its importance and willing to finance it. This means that senior managers need to focus on the short term as well as the long term implications, such as considering fibre optic broadband at the onset as well as financing the competent staff to run the system. Finally the lecturers advanced that comprehensive senior management support and commitment at the CUR is needed for budget allocation, staff commitment, the setting of realistic goals and objectives for the library and sustainability of the system.
Competent librarians are the most required components of digital library development and use. They need to be recognized and empowered by the library manager in order to run the library activities with confidence and enjoyment. They also know the significance of funds in any project development. Further they suggested that there should be a good connection system, because without this, there will never be a digital system. Updating digital information is the only way of retain its usability. Additionally, the librarians proposed that the users should be trained and encouraged to use the system. Indeed, the essence of the digital library is to be used by trained users who are able to get what they need and on time.

A consensus of the student-respondents recommended: visits to academic institutions with well established digital libraries; reliable and uninterrupted internet connection and state-of-the-art computer laboratories; in-depth training of students and staff as well as easy accessibility of digital library contents by the users. The respondents also wished their institution to liaise with other academic institutions in order to gain and share experience and knowledge. In short, the users need ongoing training in order to be able to use the digital library proficiently and to keep pace with fast changing digital resources. Appropriate programs could be devised to meet these needs.

4.8 Chapter Summary

This chapter presented the study findings on the need and effectiveness of developing a digital library at the CUR. The study also reported the findings on basic requirements for developing a new digital library and the crucial challenges that the CUR would encounter during the process. Finally, it has analysed the strategies critical in the process of digital library development.
CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter highlights the salient points from the summary and discussions of the study findings including its conclusion and recommendations. The study then makes recommendations as to what basic steps need to be taken for instituting a digital library successfully. Areas for further study are also suggested. The aim of the study was to assess the viability of developing digital libraries in academic institutions with particular reference to the Catholic University of Rwanda.

Objectives for the study included to:

i) Establish the need for developing a digital library at the Catholic University of Rwanda.

ii) Examine the basic requirements for developing a digital library at the Catholic University of Rwanda.

iii) Find out the challenges encountered during the process of establishing a digital library.

iv) Suggest a framework for developing an effective electronic library system.

5.2 Summary of Key Findings

This section presents the findings from the study in comparison to what other scholars say in literature review. This section is divided into parts as follows:
5.2.1 Significance of Developing a Digital Library at the CUR

All the respondents emphasized that in a digital library information can be available and accessible whenever, anywhere and to everyone. Further the information can be shared with similar institutions and easily kept current. In addition, distance learning is facilitated because copies of information can be accessed instantly and adjusted to the liking of the users. Finally, the respondents emphasised that librarians have better control of the selection of digital library materials. Thus, the library turns out to be wherever there is a personal computer and a network connection and the content quality will depend on the vigilance and management of librarians.

5.2.2 User Expectations

User expectations need to be crucially taken on board when implementing a digital library, because they are the very raison d’être of any digital library. The findings reveal that obtaining accurate information in diverse format; never visit a library building again and sharing information with peer institutions were mentioned as the major expectations of the respondents. The aim of any digital library is not only to improve access to different library resources, but also to allow its access without travelling to the location where it is stored. Sharing digital resources is possible whenever a common agreement with peer institutions is made.

5.2.3 Basic Requirements for Developing a Digital Library at the CUR

Based on components required for developing a digital library, the finding revealed that the respondents were unanimous in singling out competent staff; content with high quality, technology and sustainable funding as being essential prerequisites for developing any digital library. Indeed, these four elements are the bases of all other requirements including: organized
content; internet connectivity; standards among others. Trained and committed competent staff is essential in every step of digital library development. Content with quality is equivalent to the value of a digital library. Digital libraries are possible due to advanced technology which is at the centre of their developments. Sustainable funding is the most critical element in digital library development, as it is needed throughout the whole process.

5.2.4 Challenges encountered In Digital Library Development

Challenges mentioned by the respondents are: low digital and information literacy rate; management of digital content; staff training and lack of essential equipment. Since all digital libraries involve digital materials, the potential users must be conversant with computers and related technologies. Besides, management of digital content requires trained staff and basic equipment, such as scanners and servers, to handle them. The implication is that digital library development necessitates both competent staff and adequate funds.

5.2.5 Strategies for Developing a Successful Digital Library at the CUR

Suggested strategies thought to be useful to the CUR in its development of a successful digital library, are selected from 98% to 83% of the respondents’ scores. Starting by encouraging local publications, then management support and empowering, adhering to standards and data rights, careful staff training and recruitment and finally acquiring both digital and physical materials, will help to serve both digital and analogue users. It is essential for the library to train their staff so as to develop and deliver successful network-based services. Besides that, providing staff with ongoing and regular training will also assure motivation and commitment of the employees and their retention.
5.3. Conclusions

Developing a digital library at the CUR is needed so as to make access simpler and cheaper and to preserve library resources. The setting up of a digital library at the CUR would be an invaluable tool for both teaching and learning, especially in the context of distance learning as the user is able to consult materials that are stored on computers around the world. Since a digital library does not depend on physical boundaries, digital resources are stored on network servers; thus they can be accessed anytime by university members. All types of content are available including not only bibliographic and full-text content but also images, music, and video. Digital library allows rich media types to be included and managed effectively. Students and lecturers are able to create and share newly discovered knowledge. Data rights need to be respected when procuring copyrighted materials.

5.4. Recommendations

In order to establish a successful digital library, the CUR should ensure that the funding for the whole process is sustained. Moreover, it also needs to acquire competent staff; collect high quality content as well as strive for advanced technology to be able to keep up with the increasing speed of the digital age.

Besides, inquiring about the users’ needs, the management of the CUR library should set up a publicity campaign to promote itself to the world at large, including to students, to lecturers and to peer institutions.

In order to cope with the fast changing digital resources, the users need to be invited on a regular basis to attend refresher courses in the use of the library.
The CUR management should encourage students and lecturers to produce high quality papers in order to be competitive with peer institutions, since these add value and fame to any higher learning institution.

5.5 Suggestion for Further Research

As a direct result from the findings the researcher proposes to extend the scope of this study to investigate the impact, difficulties and benefits of setting up digital libraries in developing countries, with a particular reference to the Eastern Africa Community (EAC).
REFERENCES


APPENDIX I

LETTER AUTHORISING DATA COLLECTION

UNIVERSITY OF NAIROBI
FACULTY OF ARTS
DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE (DLIS)

Our Ref: UON/CHSS/DLIS/303 16th March, 2015

To whom it may concern

Dear Sir/Madam,

SUBJECT: RE: GAHONZIRE, MARIE MICHLE REG NO: C54/69200/2013

The above-named is undertaking master in Library and Information Science (MLIS) in our Department. She is in her third semester and has already embarked on her research which is a partial fulfillment in the programme.

Her research topic is “Development of Digital Libraries in Academic Institutions: the case of Catholic University of Rwanda”

Any assistance accorded to her will be appreciated.

[Signature]

Dr. Dorothy Njiraine
Ag. Chairperson
Department of Library & Information Sciences (DLIS)
25th May, 2015

Dear Respondent,

REQUEST TO FILL THE QUESTIONNAIRE

I am a post-graduate student undertaking a Masters degree in Library and Information Sciences in University of Nairobi and currently I am doing a research on “Viability of developing digital libraries in Academic Institutions: Case of the Catholic University of Rwanda”. The aim of the study is “to assess the viability of developing digital libraries in academic institutions with the view of suggesting a framework for effective development and improvement of electronic information system”. The objectives for this study are to:

(i) Establish the need for developing a digital library at the Catholic University of Rwanda.

(ii) Examine the basic requirements for developing a digital library at the Catholic University of Rwanda.

(iii) Find out the challenges that will be experienced during the process of digital library development.

(iv) Suggest a framework for developing an effective electronic library system.

The researcher has identified you as a potential respondent to assist in providing relevant information relating to the objectives of this study. The information sought from you will be treated with utmost confidence, and results of this study will be available for your use/reference.

Thank you,

Yours sincerely,

Gahonzire Marie Michèle
APPENDIX III

QUESTIONNAIRE FOR LECTURERS, LIBRARIANS AND STUDENTS

INSTRUCTIONS
Please respond by ticking (√) against your preferred response for questions with options.

Background Information
Gender: ........................................................................................................................................
Specific occupation (Staff only): ............................................................................................
Specific program (Student only): ............................................................................................

Need for developing digital library
1. The development of Digital Libraries has emerged as new strategy that allows a university
to build digital collections to accelerate changes taking place in scholarly communication.
   Do you think that there is a possibility for your institution to create a digital library?
   Yes [  ] No [  ]
   If no, please specify your answer
   ........................................................................................................................................
   ........................................................................................................................................
   ........................................................................................................................................

2. To what extent do you agree with the following statements about the need for developing
digital libraries in academic institutions? Tick (√) at the appropriate column to indicate your
extent of agreement using the following scale of Strongly Agree = 5, Agree = 4, Neutral = 3,
Disagree = 2, Strongly Disagree = 1.

<table>
<thead>
<tr>
<th>No</th>
<th>STATEMENTS</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>A digital library brings the information to the user's desk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii</td>
<td>Digital libraries are accessible 24/7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii</td>
<td>Digital libraries are not limited in terms of size.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>iv</td>
<td>Digital libraries can be accessed from anywhere around the world</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>v</td>
<td>Information can be shared</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi</td>
<td>Information is always available to everyone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vii</td>
<td>Information is easier to be kept current</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>viii</td>
<td>Multiple users can access the same information resource at the same time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ix</td>
<td>Students can receive their schooling using distance learning education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>The librarian is in full control of the selection of materials for the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>digital library</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>xi</td>
<td>There is no physical degradation of the resource due to handling, storage,</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>or vandalism.</td>
<td></td>
<td></td>
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<tr>
<td>xii</td>
<td>User can find appropriate research materials all in one place</td>
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</tbody>
</table>
User Expectations

3. Please show the extent of agreement on your expectations on a digital library. Tick (√) at the appropriate column using the following scale of Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2, Strongly Disagree = 1.

<table>
<thead>
<tr>
<th>No</th>
<th>STATEMENTS</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Get the best information in different formats</td>
<td></td>
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<td>ii.</td>
<td>Able to share information with similar institutions</td>
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<tr>
<td>iii.</td>
<td>Have information in an understandable language and context</td>
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<tr>
<td>iv.</td>
<td>Never visit a library building again</td>
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<td>v.</td>
<td>Be aware of the user information needs</td>
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</tbody>
</table>

Basic Requirements for Developing a Digital Library

4. Please indicate the extent to which you agree to the following statements about the basic requirements for developing a digital library. Tick (√) at an appropriate column using the following scale of Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2, Strongly Disagree = 1.

<table>
<thead>
<tr>
<th>No</th>
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<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Competent staff (trained and committed)</td>
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<td>ii.</td>
<td>Collection of content with higher quality</td>
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<td>iii.</td>
<td>Organized content</td>
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<td>iv.</td>
<td>Web accessible systems</td>
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<td>v.</td>
<td>Provision of networks such as the Internet and Intranets</td>
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<td>vi.</td>
<td>PCs/Servers</td>
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<td>vii.</td>
<td>Web authoring languages</td>
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<td>viii.</td>
<td>Internet Connectivity</td>
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<td>ix.</td>
<td>Be aware of standards in practice</td>
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<td>x.</td>
<td>Assurance of sustainable funding</td>
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</table>

Challenges in Developing Digital Library

5. Please indicate below which challenges your university may face in developing a digital library. *(Tick as many as possible)*

- i. Availability of content from different disciplines [ ]
- ii. Management of digital content [ ]
- iii. Unavailability of funds [ ]
- iv. Low digital and information literacy rates [ ]
- v. Staff training [ ]
- vi. Resistance to change [ ]
- vii. Technical support and security [ ]
- viii. Editing of works digitized [ ]
ix. Lack of essential equipment [ ]

x. Retrospective data conversion [ ]

Strategies for Developing a Successful Digital Library

6. Please indicate below which strategy would be appropriate for your University to create a successful digital library by ticking (✓) at the appropriate column using the following scale of Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2, Strongly Disagree = 1.

<table>
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<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Careful staff training and recruitment</td>
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<td>ii.</td>
<td>Management support and empowering</td>
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<tr>
<td>iii.</td>
<td>Getting both formats (print and digital) of the library material during acquisition process</td>
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<td>iv.</td>
<td>Adhere to standards and data rights from the beginning of the process</td>
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<td>v.</td>
<td>Encouragement of local publication by both students and lecturers</td>
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7. What are other strategies that may bring about a successful digital library to your university?

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