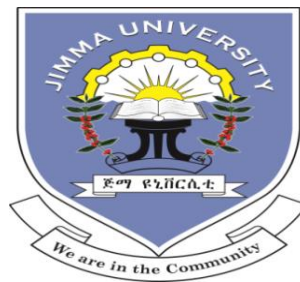


Jimma University
Jimma Institute of Technology
Faculty of Computing and Informatics
Department of Information Science



**Usability Study on Library Online Public Access
Catalogue Systems: The Case of Selected Ethiopian
University Libraries**

By: Solomon Lemma

Principal Advisor: Senait Samuel (Ph.D. Candidate)

Co-Advisor: Solomon Alemu (M.Sc.)

January, 2020

Jimma, Ethiopia

JIMMA UNIVERSITY

FACULTY OF COMPUTING AND INFORMATICS

DEPARTMENT OF INFORMATION SCIENCE

**USABILITY STUDY ON LIBRARY ONLINE PUBLIC ACCESS CATALOGUE
SYSTEMS:THE CASE OF SELECTED ETHIOPIAN UNIVERSITY LIBRARIES**

A thesis submitted to the department of information science, Jimma Institute of technology faculty of Computing and Informatics, Jimma University, in meeting the partial fulfillment for the award of the degree of master of information science (electronic & digital resources management)

.By

Solomon Lemma

Principal Advisor: Mrs. Senait Samuel (Ph.D. Candidate)

Co-Advisor: Mr. Solomon Alemu (MSc.)

January, 2020
Jimma, Ethiopia

APPROVAL SHEET

This thesis has been submitted to the department for examination with our approval as University advisors:

Name	Title	Signature	Date
_____	Chairperson	_____	_____
_____	Advisor	_____	_____
_____	Co- Advisor	_____	_____
_____	External Examiner	_____	_____
_____	Internal Examiner	_____	_____

ACKNOWLEDGEMENTS

This thesis could not have been completed without the support and guidance of some individuals and organizations. I would like to express my sincere gratitude to them. I also wish to express my deepest gratitude to my advisor Mrs. Senait Samuel (Ph.D. Candidate) and Mr. Solomon Alemu (M.Sc.) for their guidance and supervision all the way starting from commenting the draft of my proposal to finalizing the thesis.

It is an honor to me to thank, Jimma University for sponsoring my graduate study and to conduct this study. My thanks go to all my instructors for enabling me to acquire the necessary skills and sharing me their experiences. Lastly, I offer my regards and blessings to all of those who supported me in any respect during the completion of the study.

TABLE OF CONTENTS	Pages
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS AND ACRONYMS	viii
ABSTRACT	ix
CHAPTER ONE	1
INTRODUCTION.....	1
1.1. Background of the Study	1
1.2. Statement of the Problem	4
1.3. Research Questions	5
1.4. Objectives of the Study	6
1.4.1. General objective.....	6
1.4.2. Specific objectives.....	6
1.5. Significance of the Study	6
1.6. Scope of the Study	7
1.7. Operational definition of terms	7
CHAPTER TWO	9
LITERATURE REVIEW	9
2.1 Overview of OPAC.....	9
2.2. Definition and perception of usability	10
2.3. Usability of OPAC's.....	11
2.4. Existing Usability Models.....	12
2.4.1 Survey on Usability Models.....	12
2.5. Usability Components (factors).....	14
2.6. A Frame Work of Usability of OPAC.....	15
2.5.1. Usability sub Factors	16
2.6. Open Source Software Development and Librarianship	19

2.6.1 Koha Software	20
2.6.2. Evergreen Software.....	21
2.6.3 ABCD Software	22
2.6.4 WinISIS (formerly CD/ISIS)	23
2.7. Criteria for Evaluating the Usability of OPAC's.....	24
2.8. Usability Checklist.....	24
2.8.1. Accessibility.....	24
2.8.2. Identity	25
2.8.3. Navigation.....	25
2.8.4 Content.....	25
2.8.5 Design layout	26
2.8.6. Ease of use	27
2.9. Related works.....	27
CHAPTER THREE.....	31
METHODOLOGY	31
3.1. Study Area and Study Period.....	31
3.2. Population of the study	31
3.3. Sample Technique and Sample Size	32
3.3.1. Sample Technique.....	32
3.3.2 Sample size determination	33
3.4. Data Collection instrument	34
3.5. Data source.....	34
3.6. Data Analysis	34
3.7. Study variable	35
3.8. Ethical Consideration.....	35
CHAPTER FOUR.....	37

RESULTS AND DISCUSSION	37
4. Results	37
4.1. Response Rate and Socio-demographic information	37
4.1.1.Socio-demographic information	38
4.1.2. Frequency of OPAC users at higher learning institutions	39
4.1.3. Searching Strategy in OPAC	40
4.1.4 Level of online public accesses catalog awareness of users	40
4.1.5 The OPACs’ services and users’ Satisfaction in the HLI library	42
4.1.6. Difficulties /barriers/ faced by library OPAC users’ in the selected HLI.....	44
4.1.7. The Level of system Efficiency and satisfaction in higher learning institution on usability of OPAC feature.....	45
4.1.8. Regression analysis & output/result: in Regression table, A NOVAs and. Summary-Models.....	50
4.2. Qualitative data Analysis and Result	51
4.2.1. Analysis on the Interview	51
4.2.2 Analysis and Result of the Observation.....	54
4.3. Proposed Library OPAC usability Frame Work.....	54
4.3.1. Conceptual frame work.....	55
4.3.2 Theoretical framework.....	56
4.3.3 Implementation Procedure	56
4.3.4 Additional Features for Information Searching	56
4.3.5 Good Impressive Interface	57
4.4. Discussion.....	58
4.4.1 Usability of higher learning institution OPAC	58
CHAPTER FIVE	60
5. CONCLUSION AND RECOMMENDATION.....	60
5.1 Conclusions.....	60

5.2. Recommendations.....	61
5.3 Future works	62
References.....	63
Appendices.....	67
Appendices A:.....	67
Appendices ‘B’	74
Appendices ‘C’	75

LIST OF TABLES

Table 2.1 Usability attributes in various models	
Table 2.2 Listed below are some of the well-known ILS products. Notation	
Table 3.3 Total population of the study	
Table 4.1 Number of distributed and collected questionnaire	
Table 4.5 :-Socio demographic information	
Table 4.6:- Frequency of OPAC's system Use (Visit)	
Table 4.7 Purpose of OPAC use	
Table 4. 8:- Descriptive Statistics Result on searching strategy in OPAC system	
Table 4. 9:- Descriptive statistics Result on users 'level of OPAC system awareness.....	
Table 4. 10 Descriptive statistics Result on Satisfaction of the OPAC system	43
Table 4. 11:- Descriptive Statistics result on OPAC service Difficulties /barriers/ Issues.....	
Table 4.12:- Descriptive Statistics Result on OPAC Usability level of system Efficiency	
Table 4.13 Regression analysis output/result.....	
Table 4.14 Model Summary	
Table 4. 15:- Regression: Anova-Model.....	

LIST OF FIGURES

Figure 2.1: Frame Work of Usability of OPAC.....	15
Figure 4.1: Socio demographic sex Pie Chart.....	13
Figure 4.4: Proposed Library OPAC Conceptual Frame Work	15

LIST OF ABBREVIATIONS AND ACRONYMS

AACR-II	Anglo American Cataloguing Rule-2nd edition
ALA	American Library Associations
AASTU	Addis Ababa Science and Technology University
ASTU	Adama Science and Technology University
KOHA	Corpus of Historical American English
GUI	Graphical User Interfaces
HLI	Higher Learning Institute
ILS	Integrated Library System
JU	Jimma University
LIS	Library and Information System
LISE	Library and Information Science Education
MARC	Machine Readable Cataloging
OCLC	Online Computer Library Center
OPAC	Online Public Access Catalogue
OSS	Open Source Software
RDA	Resource Description and Access
SPSS	Statistical Package for Social Sciences
UAL	University Academic Libraries

ABSTRACT

Online Public Access Catalogue (OPAC) is now accessible either through intranet or internet (Web OPAC). OPAC: the library catalogue is an online database of all of the resources held in the library and one can search OPAC to locate books in the library. The purpose of this study is to assess the usability of OPAC systems of the selected Universities, from post graduate students and professional staff's perspective. It is important therefore to have Usability evaluation of OPAC at regular intervals because it helps in understanding the problems of the users, and also in marinating these gap (problems) with some changes mainly in the interface design. The study used descriptive study design with mixed method for data collection. For data collection questionnaires and interview were used. In view for this, study two University Web OPACs namely Addis Ababa University and Addis Ababa Science Technology University, were selected. The study population included postgraduate students, librarians' (professional staff including head of each selected librarian) and related members of university library. The analysis of the data on users' evaluation, preferences and expectations by a set of usability attributes enabled recommendations to be made with respect to key areas of the system functionality. Practical in the results indicated that, there was overall satisfaction about the design of the Web OPACs of the two University among the respondents, but AASTU was found to have not so satisfied on few OPAC services usability, that shown in the research analysis result. The major finding of the research reflects the usability of web-OPAC in higher education has a significant effect on the use of real, accurate information resources in the content, and on the navigation of the OPAC system. Therefore, libraries have to rethink the application of advanced web technologies to make the OPACs efficiently functional, usable and attractive for users of the fast-changing technology era to access information on OPAC in a modern technological environment.

Key word: OPAC usability, Web OPACs, Online Catalog, etc.

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

A catalogue facilitates users to access to library recourses. According to Anglo-American cataloguing Rules, catalogue was a list of library materials contained in a collection, a library or a group of libraries arranged according to some definite plan and in a wider sense, a list of materials prepared for a particular purpose. (AACR 2, 2002), A catalogue is a list of books, which had been arranged systematically. Main purpose of a catalogue was to facilitate the retrieval of an item/s in a collection through searching by an appropriate access points, for both known items and by subject AWA Wanigasooriya, (2008).

According to Wells, (2007): the library OPAC had at least three distinct functions. First it acts as a bibliographic database, an electronic version of the card catalogue that it replaced, acting as an index for the user in search, for example, of a particular book. As a logical extension of this, the OPAC increasingly provides links to electronic texts, freeing the user from the necessity of physically locating material on the library's shelves. Second, it functions as a "portal" in a way not dissimilar to a library homepage, providing links to non-bibliographical data, either relating to users themselves – information about overdue books, fines, etc. – or to other library information such as opening hours. In principle this portal function could be extended indefinitely to connect to a variety of data considered to be of interest to library users. Third, the OPAC functions as a promotional artifact, advertising the presence of the library and the services it can provide, and at the same time making a statement of authority about the communicative links that were supported and facilitated (Wells, 2007, p. 387).

In Some of Higher learning institutions of Ethiopia, Online Public Access Catalog system was as means of bibliographic-records database searching system which help the Library users' to search and communicate with available information need from their OPAC or online software resources database, which were ABCD-Software, KOHA-Software and other useful Integrated Library Software. The integrated library systems (ILS) were multifunction, adaptable software applications that allow libraries to manage, catalog and circulate their

materials to patrons. In choosing ILS software, libraries must base their decision not only on the performance and efficiency of the system, but also on its fundamental flexibility to readily adapt to the future demands and needs of their patrons (Müller, 2011). “The Online catalogs and multi database bibliographic-retrieval systems have evolved independently, with different searching capabilities to offer and different groups of users to serve. These distinctions have begun both in the areas of design and of population served. Online catalogs were becoming increasingly sophisticated, adding capabilities such as Boolean searching and index browsing. Commercial systems were simplifying command structures and offering less complex interfaces for end users” (Mi, Cathy, 2008).

Library users interact with OPAC’s which helps them to understand users’ needs and consequently to design these systems in a way appropriate to satisfy its users. For instance, most users prefer to have less text on screen and more icons instead. Moreover, users expect to see images of materials available on OPAC’s (Brown, 2006). In updating and introducing a new version of OPAC services, users should be comfortable with the new version and should not struggle to do their task and be able to find what they need, when they need it and in a form they want. Designers of these systems should therefore be fully aware of users’ skills and abilities (Borgman, 2003).

A usability study is a simple and central idea to study about information technology that involves studying software products, Accordingly, cognizant of the distinction that can be made between usability and functionality and given that less is known about the users’ tasks and inter-actions in exploring, using, and possibly generating information, included the two approaches aimed at testing usability in finding information and secondly at gauging user Perception of functionality (Johnson, Frances C. & Craven, Jenny, 2016). In our case the proposed postgraduate students and professionals were participating insight on what they have done during the evaluation sessions. Usability study is one of several general categories of testing for software products and systems. Other kinds of quantitative testing are aimed at eliminating bugs or glitches, or making software products run more smoothly. According to Nichols and Twidale, (2006), “research in open source usability has the potential to be valuable to all kinds of software development. ” They emphasize on finding ways to ease usability bug reporting as well as involving usability experts during software analysis and design phases. Referring to the difficulties in usability testing,

Lindgaard, (2006), states that “it is impossible to know whether all usability problems have been identified in a particular test or type of evaluation unless testing is repeated until it reaches an asymptote, a point at which no new problems emerge in a test. Even though it makes a good environment for users and the concerned bodies while conducted this study.

Online public access catalogues have been the most prevalent information retrieval systems available to the general public. “Even as the Web was gaining prominence it was stated that OPAC’s were the most widely-available automated retrieval systems and the first that many people encounter. However, with the increased popularity of the Internet, we can no longer assume that, OPAC is very strong and effective tool for quick and easy access to the library resources” (Kumar, 2017).

Despite the benefit of accessing a library's information remotely and saving time for a library's users, OPACs have also been shown to improve the communication between reference librarians and cataloguers. Usability is a quality attribute that assesses how easy user interfaces and other features of OPAC have to use. The word "usability" also refers to methods for improving ease-of-use during the design process Hussain, Kutar, (2009).

Even though its protocols were a widely used method for the usability testing of software, interfaces, websites, and (instructional) documents. The basic principle of this method is that potential users in counter’s, and to constantly verbalize their thoughts while working on the tasks. The method has high face validity, since the data obtained reflect the actual use of an artifact, and not the participants’ judgments about its usability. The method is embedded in a well-respected research paradigm focusing on people’s cognitive processes during the execution of a wide range of tasks (Abebr, M...et al, 2009), (Kani-Zabihi, ... et al. 2008).

But problems for the online catalogue did not start with the advent and development of the web. Therefore, from different literatures reports online catalogue’s poor functionality and difficult use can be understood as a basic issue of our academic libraries core problems of the existing library OPAC’s system. Hence, this study focus on user usability study of the OPAC’s in the selected university academic libraries in which the study conducted on the online public catalogs on (ABCD and KOHA) OPAC;s systems, focusing on issues of the nature and sources of problems users encounter in each.

1.2. Statement of the Problem

Advances in technology and use of the web have provided more choices in the delivery of and access to information and resources. According to Ogbole and Morayo (2017) finding, with user expectations becoming more demanding in terms of access to electronic information, the OPAC reflects an organized collection of databases and web. An OPAC is considered to be the heart of the library operations and the gateway of library services as it facilitates the patrons to the various services of the library and acts as an instrument of change in today's libraries Mulla, and Chandrasekhar, (2009).

“Usability testing is a means for measuring how well people can use some human- made object (such as a web page, a computer interface, a document, or a device) for its intended purpose. Usability testing tries to find out 'user-friendliness' of the system, which is obviously subjective. Repeated user interviews, surveys, video recording of user sessions, and other techniques can be used for this purpose. Hence the benefit of multiple navigation is that it allows quick, efficient access to multiple sources of information without the user leaving the OPAC” (Ruzegea, M., 2012). The number of studies on usability of higher learning institution web OPAC's is very limited. However, in some of the developed countries, the studies on usability of university OPAC's is conducted by Ruzegea, (2012) that intends to investigate the usability and effectiveness of user-interface features. This study also seeks to understand users' perception on the effectiveness of IIUM's OPAC's interface design whether or not they are satisfied. Likewise Griffiths, *etal.*, (2007) indicated that user satisfaction is a multidimensional, subjective variable which can be affected by many factors other than performance of the system or searcher. This research attempted to understand what user satisfaction is, how it is measured, what factors affect it, and why findings on user satisfaction have been so varied and contradictory among these university libraries OPACs.

But it is somewhat encouraging that, even though users preferred to use the web over the library catalogue and still do so, studies have continuously proven that users still see the catalogue as a trustworthy, well-organized and impressive tool (Wenzler, 2007). According Yushiana, M. (2012) in his heuristic evaluation of interface usability in web-based OPAC's study, the Web OPAC interface conforms to at least 70 percent usability properties prescribed and Usability problems violated in the interface were identified. Furthermore, Mwatela, Willy M. (2013) conducted a research which is titled as ‘Factors influencing utilization of Library Services and Resources at

University of Nairobi-Library. On this study the researcher has investigate a set of individuals' knowledge and skills on one hand and organizational characteristics (user support programs) on the other hand, with the intention of exploring ways of optimizing utilization of the integrated library resources. Even though the study has highly emphasized the system difficulties faced by the users in locating the library materials through OPAC's, Usability testing of Web OPAC at regular intervals helps in understanding the problems of the users, and also in eliminating these problems with some changes in the interface design (Nielsen, 2012). Hence, this look as a unique usability practice because it provides direct input on how real users use the.

In Line With this, knowing the OPAC's usability of the universities would be important to make improvement on the usability status of the higher learning institutions. It's also worth that the service users including students and academics staffs', Librarians and guests usability status needs to be assessed through conducting research on OPAC's usability since skill and needs of users is different (Nielsen, 2012).The academic libraries OPAC users manifest special and unique needs and problems during their searching for information. Few user studies could be located which focused exclusively on how user-interfaces may have different impact to different categories of university library user communities (Galatz & Wiley, 2002). Generally, adequate assessment of OPAC's usability is required to design a better OPAC system and customized a usability approaches so that it meets user information needs and to make the system ease for use.

Based on this gap, the current study intends to investigate the usability of Library OPAC systems among postgraduate students and Library professionals of Ethiopian Higher Institutions in relation to variables that influence the usability of the systems. This study will also seek to understand users' perception on the effectiveness of OPAC's system and whether or not they are satisfied.

1.3. Research Questions

In order to achieve the objective of the study the following research questions were prepared.

1. To what extent does OPAC's systems features meet user's information needs in selected Ethiopian Higher Institutions?
2. What are the factors that affect the usability of OPAC's use?
3. Are there any experienced difficulties in the use of library OPAC's System use?

1.4. Objectives of the Study

1.4.1. General objective

The main objective of this study was to assess the usability of OPAC systems in the selected higher learning institutions of Ethiopia.

1.4.2. Specific objectives

The specific objectives of the study were to:

- To assess the extent of OPAC system features meet the user information need in selected Ethiopian Higher Institutions.
- To identify the factors that affect usability of OPAC's, system navigation in libraries services in the selected public University Libraries.
- To identify the experienced difficulties in the use of library OPAC's use in the selected public university libraries.

1.5. Significance of the Study

The findings of this study can increase patronage of the university students and staff members to the library OPAC in the case of selected Ethiopian university libraries. Based on this the result will offer the opportunities to utilize effectively and deliver a range of resources as well as services: such as bibliographic records (information), e-journals, online databases, and others. In addition to the above, this study can strengthen to show the opportunities, for the library loan descriptions and provide access to various types resources via the online catalogue OPAC by using the systems. The study can be also beneficial to library policy makers who need to come up with a set of standard policy guiding OPAC use in Ethiopian libraries that would aid uniformity, consistency and lead to increase in use of the library OPAC by Ethiopian university library users. The result of this study is also assumed to be significant in giving power to facilitate the usability study on library online public access catalogue systems in Ethiopian university. It would be also useful for online catalogue OPAC users by providing general understanding about the usability study implementation. Hence an OPAC provide the users the benefits of online access to the library's catalogue. In general, the result of this study serves as basis for future study on OPAC

use in university libraries of Ethiopian as there were more benefits of OPAC in this information age which is yet to be identified.

1.6. Scope of the Study

The study conducted in Addis Ababa University and Addis Ababa Science Technology University and it does not include other universities in the country because of time constraint. The study delimited in to two government universities which were previously mentioned above. The conceptual scope of the present study delimited on studying KOHA/OPAC software usability level of in the above institution web-OPAC in the selected cases. The present study included postgraduate students, librarians' (professional staff including head of each selected librarian). The main aim of the study was to assess the purpose, knowledge and frequency of using OPAC and problems faced by users. A sample of 268 users taken to cover various disciplines (departments).

1.7. Operational definition of terms

Catalogue :- a list or record, as of items for sale or courses at a university, systematically arranged and often including descriptive material: a stamp catalog. Catalogue is something that contains such a list or record, as a book, leaflet, or file catalogue is a list of the contents of a library or a group of libraries, arranged according to any of various systems.

A library catalog or library catalogue: - is a register of all bibliographic items found in a library or group of libraries, such as a network of libraries at several locations. A bibliographic item can be any information entity (e.g., books, computer files, graphics, realia, cartographic materials, etc.) that is considered library material (e.g., a single novel in an anthology), or a group of library materials (e.g., a trilogy), or linked from the catalog (e.g., a webpage) as far as it is relevant to the catalog and to the users (patrons) of the library.

Usability:- is Usability measures, effectiveness, efficiency, satisfaction, information retrieval, usability testing, user studies. We adopt ISO's broad definition of usability as consisting of three distinct aspects:

1. Effectiveness, which is the accuracy and completeness, Indicators of effectiveness include quality of solution and error rates.

2. Efficiency, which is the relation between (1) the accuracy and completeness with which users achieve certain goals and (2) the resources expended in achieving them. Indicators

3. Satisfaction, which is the users' comfort with and positive attitudes towards the use of the system. Users' satisfaction can be measured by attitude rating scales. **Source:** by Frekjm, Erik, (2000).

Library management:- is a sub-discipline of institutional management that focuses on specific issues faced by libraries and library management professionals. Library management encompasses normal management tasks as well as intellectual freedom, anti-censorship, and fundraising tasks. Issues faced in library management frequently overlap those faced in management of non-profit organizations.

Interlibrary loan:- One of the functions of a library that is a member of a consortium or network, where materials are loaned to member libraries.

Library automation:- A generic term used to refer to the application of computers in libraries to automate operations.

Open Source:- the software is most likely free and the source code is completely open. You can modify, fix, add to, take away, and change the code any way you wish. Proprietary the software costs money and the source code are restricted. You cannot modify, fix, add to, take away, or change the code in any form.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview of OPAC

OPAC is the Online Public Access Catalogue or, in other words, the library catalogue. It is an online database of all of the resources held in the library. The users can search OPAC to locate books in the library. It lists the number of the items, whether they were in the library or out on loan, and their call number (Kani-Zabihi, 2008).

The Online Public Access Catalogue (OPAC) is an information retrieval system characterized by short bibliographic records, mainly of books, journals, and audiovisual materials available in a particular library. This, coupled with a Boolean search interface and a heterogeneous user population with diverse needs, presents special problems for subject searching by end users. To perform effective subject searching in the OPAC system requires a wide range of knowledge and skills (Nagarkar, 2008). The trend toward Web-based OPAC interfaces and the developments in Internet and digital library technologies present fresh opportunities for enhancing the effectiveness of the OPAC system for subject searching. An OPAC database records are usually derived from the MARC format. The records were brief bibliographic descriptions enriched with a small number of controlled subject descriptors (often taken from the Library of Congress Subject Headings) and a classification number (usually a Library of Congress or a Dewey decimal class number). The database records, thus, contain minimal information for searching—little more than the author, title, publication year, subject description, and class number (Kochtanek, et al. 2002).

The subject descriptors were selected to reflect the subject content of the item as a whole rather than to provide in-depth indexing of the information contained in the item. Web OPAC is an OPAC, which is provided on the web and with the help of internet anybody can access it from anywhere. According to Washington University in St. Louis, “A Web OPAC interfaces, which uses the World Wide Web protocol to act as an OPAC.” According to ODLIS, “An Online Public Access Catalogue (OPAC) that uses a graphical user interface (GUI) accessible via the

World Wide Web, as opposed to a text-based interface accessible via tele- net. “Web OPAC is an independent program designed separately from the library program (White, et al. 2006).

It is programmed to facilitate members to access the OPAC, through their own search, for the ease of borrowing, instead of searching through the card catalogue. In addition, members can also request for the information about borrowing, reservation, etc. related to their own library profile, as well as to make automatic reservation (Kani, et al. 2008). As the above concept the Library OPAC system has facilitate the library catalogue system as well as for the ease of library services.

2.2. Definition and perception of usability

Usability is the ease of use and learns ability of a human-made object such as a tool or device. In software engineering, usability is the degree to which a software can be used by specified consumers to achieve quantified objectives with effectiveness, efficiency, and satisfaction in a quantified context of use (Kan, & Poo, 2005).

“The object of use can be a software application, website, book, tool, machine, process, vehicle, or anything a human interacts with. A usability study may be conducted as a primary job function by a usability analyst or as a secondary job function by designers, technical writers, marketing personnel, and others. It is widely used in consumer electronics, communication, and knowledge transfer objects (such as a cookbook, a document or online help) and mechanical objects such as a door handle or a hammer”(Foster, et al.2007).

“Usability includes methods of measuring usability, such as needs analysis and the study of the principles behind an object's perceived efficiency or elegance. In human-computer interaction and computer science, usability studies the elegance and clarity with which the interaction with a computer program or a web site (web usability) is designed. Usability considers user satisfaction and utility as quality components, and aims to improve user experience through iterative design”(Gallaway, et al. 2012).

Usability study is a means for measuring how well people can use some human- made object (such as a web page, a computer interface, a document, or a device) for its intended purpose. Usability testing tries to find out 'user-friendliness' of the system, which is obviously subjective. Repeated user interviews, surveys, video recording of user sessions, and other techniques can be used for this purpose. Apart from these, technique

of task analysis also can be used where in, certain tasks were assigned to the users and observations were made and further analyzed.

The academic libraries OPAC users manifest special and unique needs and problems during their searching for information. Few user studies could be located which focused exclusively on how user-interfaces may have different impact to different categories of university library user communities (Becker, et al.2013). It is on this note that this study sets to determine the factors which affect online public access catalogue and sustainable use by library users and the ways of improving on it.

2.3. Usability of OPAC's

Usability of a OPAC's a means of exchange to how easy it is to find information and navigate many pages of the site. Usability, or how easy it is to use an open source software - site, is serious because if a site is difficult to use, users go away elsewhere for the information seeking purpose or service (Gallaway, 2012).

Libraries' Online Public Access Catalogs (OPCs) were one of the highly visible end user searching tools. Online catalog user studies have revealed, among other findings, that catalog users have the most difficulty with information searching and place the highest priority for improvements on various information search enhancements (Craven, 2010).

Usability evaluation is a means for measuring how well people can use some human- made object (such as a web page, a computer interface, a document, or a device) for its intended purpose. Usability testing tries to find out 'user-friendliness' of the system, which is obviously subjective. Repeated user interviews, surveys, video recording of user sessions, and other techniques can be used for this purpose. Apart from these, technique of task analysis also can be used where in, certain tasks were assigned to the users and observations were made and further analyzed .The academic libraries OPAC users' manifest special and unique needs and problems during their searching for information (Ruzegea, 2012).

In view of the study, usability testing of three Web OPACs from different countries was undertaken. A common list of tasks, to search the specific information on Web OPACs, was designed. To perform these tasks using browse, basic and advanced search facilities of three web OPACs. Nielsen, Jacob, (2012) which is considered as a pioneering work in the field of usability

testing. He has discussed heuristics principles of usability testing, task-based usability, attributes of usability, usability assessment methods, interface standards, etc. It helped in deciding the methodology of the present study.

2.4. Existing Usability Models

There are a number of standards and models in literature each of which describes usability in terms of a different set of attributes that were very briefly and vaguely defined. Also the models were not homogeneous i.e. when they overlap, they do so only partially, with different terms used to include the same attribute or with the same term used to describe different concepts. Therefore, they were very difficult to use and to communicate. The lack of a consistent model leads to major problems in the evaluation of usability, as a consensus cannot be achieved on the definition of usability amongst researchers. There is very little information about how to select a set of usability factors or metrics (Dubey, Sanjay Kumar, 2012). Hence there is a need for an integrated model that incorporates different viewpoints on usability and defines it in a uniform way. An integrated model must also be generic enough so that developers and experts can use it to measure usability for different kinds of software systems and apply it through all the phases of development.

2.4.1 Survey on Usability Models

Over the past few decades, several different standards and models for quantifying and assessing usability have been proposed. In this section the researcher was assessing some of these models, highlighting the attributes on which usability has been considered to depend. Mc Call's model described usability as operability, training and communicativeness. In FURPS quality model the concept of usability includes aesthetics, human factors, online and context sensitive help, wizards and agents, user documentation, consistency in the user interface, and training materials. IEEE Std. 1061, described usability as depending upon comprehensibility, ease of learning, and communicativeness Nielsen, Sano, (2012), refers to learn ability, efficiency, memorability, errors and satisfaction as usability attributes. According Ruzagea, Mboni (2011), generally, usability is mainly a characteristic of the user interface, but is also associated with the functionalities of the product and the process to design it. It describes how well a product can be used for its intended purpose by its target users with efficiency, effectiveness, and satisfaction, also taking into account the requirements from its context of use. Dix, et al. & Dubey, et al. (2012) described

usability in terms of effectiveness, efficiency, satisfaction and learnability. Usability attributes given in various models were summarized in Table 2.1:.

Table 2.1: Usability attributes in various models

Model	Usability Attributes
McCall	Operability, Training, Communicativeness
Boehm	Portability, Maintainability
Shackle	Effectiveness, Learnability, Flexibility, Subjectively Pleasing
Bevan et al.	Type of Product, Type of User, Ease of Use, Acceptability FURPS
FURPS [29]	Aesthetics, Human Factors, Online and context sensitive help, wizards and agents, User Documentation, Consistency, Training Materials
IEEE Std. 1061	Comprehensibility, Ease of Learning, Communicativeness
Nielsen	Learnability, Efficiency, Memorability, Errors, Satisfaction Preece
Preece et al.	Safety, Effectiveness, Efficiency, Enjoyableness
Preece et al.	Learnability, Efficiency, Throughput, Flexibility, Attitude Dix
ISO 9126-1	Understandability, Learnability, Operability, Attractiveness, Usability compliance
Donyaee et al.	Efficiency, Effectiveness, Productivity, Satisfaction, Learnability, Safety, Trustfulness, Accessibility, Universality, Usefulness
Schneiderman et al.	Time to learn, Speed of Performance, Rate of Errors by users, Retention over time, Subjective Satisfaction.

Source: <https://www.researchgate.net/>).

The majority of research on usability studies either yields system design principles or intends to improve the design of an existing system. Researchers identified different attributes of usability from various disciplines. For example, in his early study, Booth (1989) suggested four aspects of usability, namely, usefulness, effectiveness, learnability, and attitude. Shaker (1991) identified four usability evaluation criteria focusing on how users accomplish their tasks in using a system, learnability, flexibility, effectiveness, and user attitude. Nielsen's model (2012), is one of the most cited in the usability engineering area, posits five attributes: learnability; efficiency; memorability; low error rate (easy error recovery); and subjective satisfaction. Another representative usability model that is proposed by the International Organization for Standardization (ISO) accounts for usability based on three main constructs, such as effectiveness, efficiency, and satisfaction. Therefore, based on the above literatures

the researcher suggests and gave the priority to identify the usability evaluation of the system by the Nelsen's and ISO models were best from others models. Therefore, we have used for this research to evaluate whether the system is accomplish according the observation task implemented in the study.

2.5. Usability Components (factors)

Navigation: This refers to finding one's way to the desired information through menus, graphical components, links and page sequence, and layout (Palmer, 2002) as well as, even while doing this, knowing where one is in the site (Roy et al., 2001).

Interaction: This refers to responses produced by the system to the user's actions (Palmer, 2002) and the interaction between the system and user.

Learnability: The ease with which the user can figure out how to use the product for the first time. iPhones: no user guide. Yes, it can be frustrating when starting out for the first time, but just tap on something and you discover something new and Websites. This is associated with the skill levels of a web site user and thereby the level of effort needed to learn how to operate the system (Calero, et al. 2005).

Ease of use: This refers to being able to operate a web site without experiencing any difficulty and trouble.

Response time: This is the time needed by the system to respond to the activity of a user (Palmer, 2002).

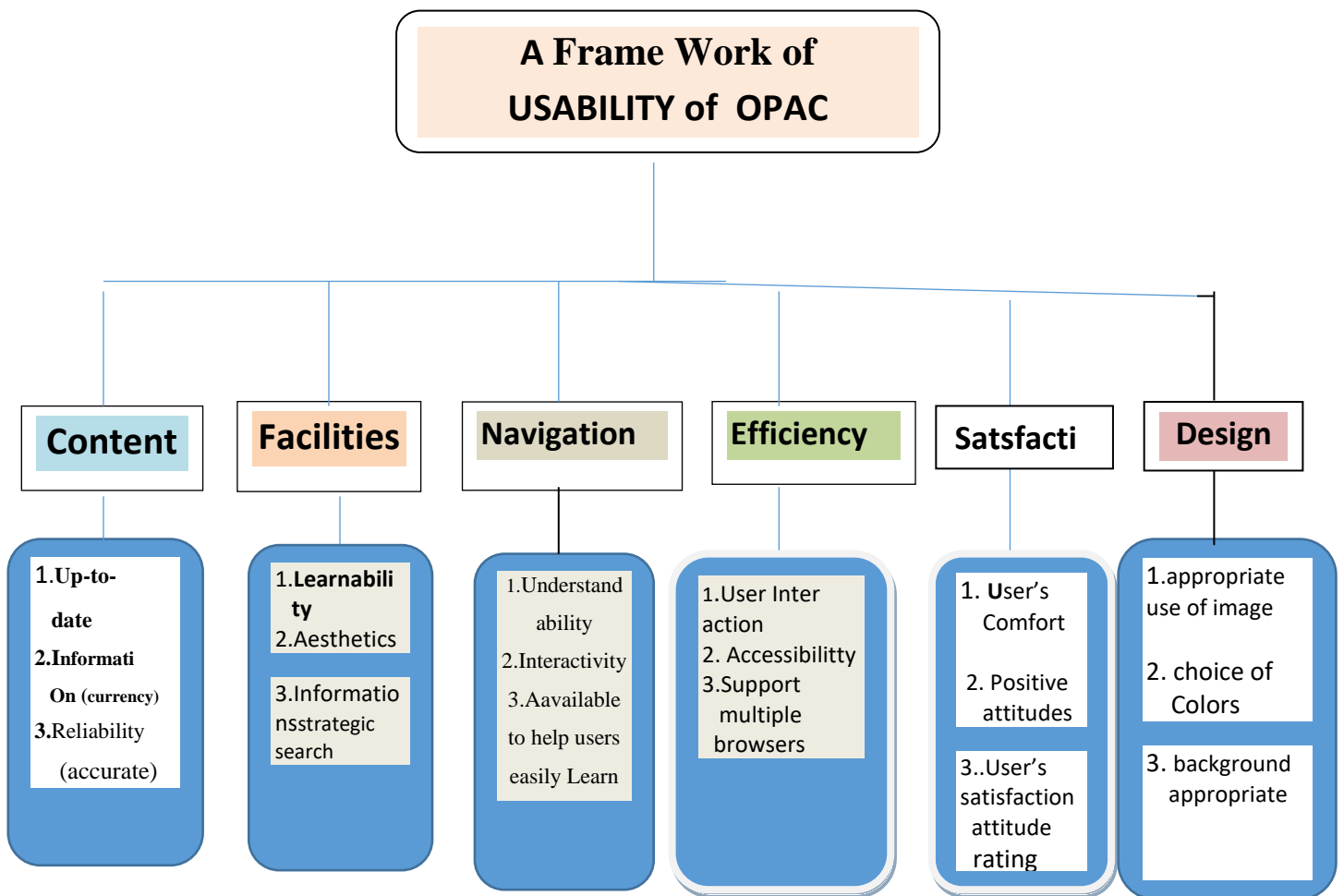
Memorability: This is the ease of recall of the main functions and their presentation on the web site when a user revisits the page (Nielsen, 2003). How well a user can recall the system after a period without using it, iPhone: I can upgrade from a 4 to a 6s without any issues because the main functions were the same, just a few changes on the outside and Website: If it's been awhile since I've been to your site can I still hop on & get right to work? or do I have to spend time figuring it out all over again?

Efficiency: This is the ability of the web site to allow users to work quickly (Reilly, et al. 2003; Nielsen, 2003) to attain their desired goal with the minimum number of clicks.

Satisfaction: This is the general pleasure a user feels when using a web site. Users' comfort with and positive attitudes towards the use of the system. Users' satisfaction can be measured by attitude rating scales.

Errors: The amount and severity of errors both from the system and the user and ebsite: Always test your website & the processes yourself. Ask others to test it for you too! I just reworked my home page & created 5 tasks (thanks to advice from West Coast UX) for a few select people to go through and test out my site. You want to give them specific tasks (Ruzegea, 2012).

2.6. A Frame Work of Usability of OPAC



Figur.1 Adopted from: Nielsen's and ISO Usability Evaluation Model (2012).

2.5.1. Usability sub Factors

The factors of the proposed model are further decomposed into number of sub characteristics or sub usability factors. Brief descriptions of the high-level factors, their sub categories and how the sub characteristics under each high-level factor were compiled and regrouped under each high-level characteristic are explained in the following sections Lin and Joyce, (2004).

Based on the sub characteristics in the ISO model, the reviewed website models, and other related works the sub characteristics identified for usability are:

Content (Website Information Quality)

This factor is not part of the base model, but it is part of the website usability models studied and it is frequently mentioned in previous related studies of higher learning institution websites. Content is the information provided on a website. After reorganizing the sub factors into categories based on their definitions, the following sub characteristics or factors were identified as sub characteristics for content: relevance of information, information accuracy, up-to-date information (currency), identity of the organization and Authority. It consists of seven subcategories. These are: up-to-date information: The information is up-to-date, current and often updated; relevant information: The information is sufficient and relevant to user needs, e.g. content is concise and non-repetitive, terminology/terms are clear and unambiguous; no under-construction pages: There is no ‘under construction’ pages; accurate information: The information is accurate; information about the university or OPAC services.

More importantly, as previously discussed the Web OPAC’s content/information consists different basic subcategories in which the library user’s may able to access the library’s own online catalog, indexes and database, or internet resources, as well as local resources any kind of problems Micali, and Cimino, (2008).

Up-to-date information (currency)

The website must deliver current information related to current situations in the university or institution (upcoming events, news). There should also be some means for users to know the website is updated. Displaying the date when exactly the content was last updated is one

approach to help users recognize that the specific time when the information was released and hence relate to the situations that occur during that specific time.

Reliability (accurate) information

Reliability is mainly concerned with the performance of the higher learning institution website. This factor is included in the website models reviewed. According to the ISO model, reliability consists of three sub characteristics: fault tolerance, availability and recoverability. Those are considered to be part of the new model as sub characteristics of reliability is all about the performance of the website and the performance of the website starts with the fact whether the website is available to users or not to the capability of the website to recover quickly at times of frequently asked questions, clear error messages and contact information are one of the possible methods to facilitate the interaction of users with the website Interactive feedback systems email Communications and free call systems are basic tools to support the interaction of users with the website Lin and Joyce, (2004).

Authority

The information about authors who edit the contents of pages in the website should be for any kind of reference users would lie to make. Making available these information increase the credibility of the content. References used from other sources outside the academic institutions should also be indicated by citation or putting a direct link to the reference.

Learnability

The website should not be bulky for users to learn how to use it. Necessary help documents other supplemental materials describing how to use the website, how to find particular kind of information or how to perform a certain type of task on the website should be available to help users easily learn to use the site Micali, and Cimino, (2008).

Interactivity

A website must provide facilities for users to interact with the Webmaster, a particular professor or an author of content in the site. Providing FAQ that summarizes answers to

Aesthetics (attractiveness)

The user interface of the website should be attractive, enjoyable and pleasant enough for users to create an emotional appeal to use the site. In addition, the choice of color, label names and font types used must be consistent throughout the website

Ease of use:

In which the user can figure out how to use the product for the first time. I Phones: no user guide. Yes, it can be frustrating when starting out for the first time, but just tap on something and you discover something new and Websites. This is associated with the skill levels of a web site user and thereby the level of effort needed to learn how to operate the system (Calero, et al. 2005).

Efficiency

The amount of time the website takes to load or perform tasks should be short. Users should be able to open pages within few clicks.

The website should be technically capable of supporting website users with different disabilities access the website. Accessibility also indicates the capability of the website to support multiple browsers.

Satisfaction

This is the general pleasure a user feels when using a web, and other open sources site.

Design layout,

It comprises six subcategories: Aesthetic design: The site is attractive and appealing so that it impresses the potential client; appropriate use of images: The quality of images is sufficient, there were no broken images, and images make a contribution to the understanding and navigation of the site, image size is relevant so that it has minimal effect on loading time; appropriate choice of fonts: font types were appropriate and easy to read; appropriate choice of colors: Choice of colors for both fonts and background is appropriate, the combination of background and font colors is appropriate; appropriate page design: Pages are neat, page margins are sufficient, the page title is appropriate; and consistency: Page layout or style is consistent throughout the website: e.g. justification of text, font types,

font sizes, colors, and position of the navigation menu in each page (Aziz & Kamaludin, 2014).

2.6. Open Source Software Development and Librarianship

Open Source Software is just as much about freedom as it is about computer technology. In fact, it uses computer technology to express freedom. These principles were not too far from the principles of modern librarianship, and therefore, the use of Open Source Software is a natural fit for librarians. Information has never been free. An information professionals we understand this better than most people. There were real cost to collecting, organizing, archiving, disseminating data, information and knowledge. Despite these costs, you do not need checkbook visiting library. The reasoning behind this is based on belief that the free access to the world's data and information enlarge the sphere of knowledge and understanding. These same principles from the basic of open source software. It allows individual or group to take control over hardware and software instead of the other way around. Open Source Software provide you with more choice and more opportunity. Just as we believe free access to data and information expand the sphere of knowledge and better humanity, the free access to computer programs enable us to expand our ability to use computers as tools to improve our lives, not become slaves to them.

1. Both OSS development and librarianship put a premium on open access. Both camps hope the shared information used to improve our place in the world.
2. Human interactions were a necessary part of the mix. Open source development requires an understanding of the problem the computer application is trying to solve, and the maintainer must assimilate patches with the application. Librarians understand that information seeking behaviorism a human process. While databases and many “digital libraries” house information, these collections were really “data stores” until the data is given value and put to use whereby the stores become libraries.

3. It has been stated that open source development remove the necessity for Programmers. Ironically, librarianship is flowering under new rubrics such as information architects and knowledge managers.

Integrated Library Systems (ILS) is the current wave for library automation. An ILS combines several activities of the library into one integrated system, allowing the library staff to perform all their functions online. These activities include simple housekeeping activities like acquisition, cataloguing to user services, and inter-library loan activities. In the last few years, we have seen the development of a number of ILS products in the open source world. One important trend in these kind products is the use of web-based client/server architecture (Müller, 2011).

Table 2.2: Some of the well-known ILS products.(Notation)

Notation	Source	Originated
Koha	http://www.koha.org	New Zealand
Evergreen	http://www.open-ils.org/	USA
OpenBiblio	http://obiblio.sourceforge.net/	Spain
NewGenLib	http://www.verussolutions.biz/	India
OPALS	http://www.mediaflex.net/	USA
PMB	http://www.pmbservices.fr/nouveau_site/	French
Emilda	http://www.emilda.org/	Finland

Source: by Sirohi, (2010)

2.6.1 Koha Software

Koha is the first open source fully featured integrated library system (ILS) used by a considerable number of libraries in USA, New Zealand, and Europe. The Koha ILS includes catalogue, OPAC, circulation, member management, and acquisitions package. Koha is used by public libraries, private collectors, not-profit organizations, churches, schools, and corporate Sirohi, Gupta, (2010).

The best sources of reliable information about a particular library application were usually librarians who were currently using it. In selecting software for library automation, first, it is important to have adequate knowledge of the available software. Secondly, verify the

software capabilities, weaknesses, and possibility to meet the needs of users as well as future improvements. According Ngozi, B. (2015), discussed that, the relevance of the application of information and communication technology in library activities such as acquisition, cataloguing, circulation, serials management, etc.

Koha Modules

Koha has all essential modules that a complete ILS should have. Koha has acquisition, circulation, cataloguing, OPAC, and serials module. The brief details of the same are as mentioned below in this Section.

Acquisition: Acquisition module of Koha works in two modes. Simple mode and advanced mode. The simple mode provides an interface for adding new holdings to the catalogue. Advanced mode provides options and interface for tracking of acquisition process such as requests, orders, claiming, invoicing, budget control and other processing of the library.

Cataloguing: The cataloguing module of Koha follows worldwide recognized MARC/MARC21 format for creating bibliographic records. Additionally, it can also convert these records to ISBD format. Z39.50 protocol is implemented to retrieve the cataloguing records of other libraries.

Circulation: Circulation module of Koha provides an easy interface for issuing or returning of books. Moreover patron management is also available in this module. This module calculates fine on overdue materials automatically. There is provision to operate with the institutional email server to provide email notifications to the user regarding checking out and in.

Serials: Serial module of Koha provides interface for registering periodical subscription, to renew them and to track the arrival of them. It also forwards the information of library holdings to the OPAC and keeps the patrons abreast about the serial issues available in the library.

OPAC: Online Public Access Catalogue of Koha is very interesting. It provides simple Google type search option with an advanced Boolean logic-based search.

2.6.2. Evergreen Software

This is an open source Integrated Library System (ILS). It includes circulation and cataloguing features, OPAC, SIP2.0 support for interaction with software administrator and

search/retrieval through Z39.50. Evergreen also features the Open Scalable Request Framework (Open SRF, pronounced 'open surf') that allows developers to create applications for Evergreen with a minimum of knowledge of its structure. It operates on Debian or Ubuntu Linux servers. It is operable in English and issued under a GNU General Public License (GPL) (Babu, 2013).

Evergreen software features include: Circulation, Cataloging, Online public access catalog (OPAC), Acquisitions, Statistical Reporting, Z39.50 compliant, Available for Windows & Linux and Easy to install and maintain.

The software is available at: <http://evergreen-ils.org/downloads.php>, Software support URL: <http://www.evergreensys.com/support/contactsupport/while> the Mailing List is at: <http://evergreen-ils.org/listserv.php> (Ngozi, 2015).

2.6.3 ABCD Software

ABCD, which in full is, “Automation of libraries and Centers of Documentation” is operable in English. The name itself already expresses the ambition of the software suite to provide not only automation functions for traditional libraries but also other information providers such as documentation centers. It is developed by BIREME (WHO, Brazil) in collaboration with the Flemish Interuniversity Council, Belgium, and using UNESCO’s ISIS database technology. This software provides flexibility and versatility. It covers all the major functions in a library such as:

- Acquisitions
- Bibliographic database management
- User management
- Statistical Reporting
- Serial control
- Online end-user searching
- Z39.50 compliant.

The software is available at: <https://sites.google.com/site/abcdlibraryautomationsoftware/downloads>. It is available For Linux and the tutorial can be seen at: <https://sites.google.com/site/abcdlibraryautomationsoftware/downloads/tutotials-help-files>.

2.6.4 WinISIS (formerly CD/ISIS)

WinISIS is a Windows version of the CDS/ISIS system (Computerized Information Service Integrated Scientific Information System) which was developed because CDS/ISIS was not compatible with the WINDOWS operating system. It originated at ILO and is developed by UNESCO. The first Window version of CDS/ISIS was distributed for testing in May 1995 and the first Win ISIS version officially realized was version 1.31 launched in November 1998. It can run on a single computer or in a local area network.

It is available at: <http://www.unesco.org/isis/files/winisislicense.html> e. New Gen Lib- This is an integrated library management system developed by Versus Solutions Pvt. Ltd. Domain expertise is provided by Kesavan Institute of Information and Knowledge Management in Hyderabad, India. New Gen Lib version 1.0 was released in March 2005. On 9 January 2008, New Gen Lib was declared Open Source Software under GNU GPL. The latest version of New Gen Lib is 3.0.4 R1 released on 13 September 2012.(Haravu (2009)).

According to Haravu (2009), New Gen Lib has the following main modules:

- Acquisitions
- Technical Processing
- Serials management
- Circulation
- Administration
- MIS Reports
- Task to do today (daily scheduler)
- OPAC

Some advanced functional features of New Gen Lib have include different functions provision for frequently used predefined templates along with freedom of defining own customized data entry templates in Cataloguing and have other additional functions.

For, Linux and the tutorial can be seen at:

<https://sites.google.com/site/abcdlibraryautomationsoftware/downloads/tutorials-help-files>

Source: Ngozi, B. (2015). Library Automation and Use of Open Source Software to Maximize Library Automation and Use of Open Source Software to Maximize Library activeness.

2.7. Criteria for Evaluating the Usability of OPAC's

Consequently, the evaluation criteria are:

- Relevance: how relevant items to the user needs returns the tagging functionality
- Reliability: could the tags guide the user's queries
- Format: is the integration of OPAC records with object from the digital library helpful
- Timeliness: by examining the tags awareness
- Learnability: how easy to learn is the navigation using the tag cloud as well as the Service interface
- Navigation: how easy is the navigation using the tag cloud as well as the service interface
- Information architecture: how usable is the information frames in the user's desktop
- Aesthetics: which is the user opinion concerning the interface design.

The first four criteria correspond to the usefulness concept, while the rest correspond to usability (Gavrilis, Dimitris, Kakali, Constantia & Papatheodorou, Christos, (N.D.)).

On the other hand, usability evaluation criteria such as Accessibility, Navigation, Design layout, content, ease of use and communication and organization/architecture.

2.8. Usability Checklist

2.8.1. Accessibility

This section contains not only traditional accessibility issues, but anything that might keep a visitor from being able to access the information on a website. If no one can load your site, or the type is too small to read, all of the usability in the world won't matter. The most common checklist in the accessibility were; site load-time is reasonable, adequate text-to-

background contrast, font size/spacing is easy to read, flash & add-ons were used sparingly, images have appropriate alt tags and site. Danny C. (2005).

2.8.2. Identity

A key question when someone first comes to your site is "Who are you?" It's important to answer it quickly, and make the paths to obvious follow-up questions clear. The common checklist in the identity was: Company Logo Is Prominently Placed, Tagline Makes Company's Purpose Clear, Home-page is Digestible in 5 Seconds, Clear Path to Company Information and Clear Path to contact information.

2.8.3. Navigation

Once people generally know who you were and what you do, they need clear paths to the content that interests them. Information architecture is a huge topic, but these points cover some of the basics. Almost every site on the web has had a main menu since the first browsers came on the market. Make your main navigation easy to find, read, and use. If you have two or more navigation areas, you make it clear why they were different. Don't say "Communicate Online with Our Team" when "Contact us" do just fine. Your main navigation should be short, to the point, and easy for mere mortals to grasp Danny C. (2005).

The underlined, blue link is a staple of the web. A little artistic license is ok, but consider at least making your links either blue or underlined. Links should stand out, and you should use them sparingly enough that they didn't disrupt your content. If you have a site search, make sure it's prominent. Usability guidelines tend to prefer the upper-right corner of the page. Keep the button simple and clear - "Search" still works best for most sites (Gaál, 2017).

2.8.4 Content

This assessment whether a site includes the information users requires. Research stresses the importance of this factor and shows that it is one of the most important factors that influence web usability (Agarwal, & Venkatesh, 2002). It consists of seven subcategories. These were: up-to-date information: The information is up-to-date, current and often updated;

relevant information: The information is sufficient and relevant to user needs, e.g. content is concise and non-repetitive, terminology/terms were clear and unambiguous; no under-construction pages: There is no 'under construction' pages; accurate information: The information is accurate; information about the university. More importantly, as previously discussed the Web OPAC's content/information consists different basic subcategories in which the library user's may able to access the library's own online catalog, indexes and database, or internet resources, as well as local resources.

2.8.5 Design layout

.In terms of design layout, it comprises six subcategories: Aesthetic design: The site is attractive and appealing so that it impresses the potential client; appropriate use of images: The quality of images is sufficient, there were no broken images, and images make a contribution to the understanding and navigation of the site, image size is relevant so that it has minimal effect on loading time; appropriate choice of fonts: Font types were appropriate and easy to read; appropriate choice of colors: Choice of colors for both fonts and background is appropriate, the combination of background and font colors is appropriate; appropriate page design: Pages were neat, page margins were sufficient, the page title is appropriate; and consistency: Page layout or style is consistent throughout the website: e.g. justification of text, font types, font sizes, colors, and position of the navigation menu in each page (Aziz & Kamaludin, 2014).

Individuals involved with designing and maintaining a web site may have a work experience background from three different professions, this may include a librarian (with historical focus on text) a graphical designer (with a traditional focus on designing and graphics) and finally a computer coding person (whose interest is with the technology itself) If only one or two persons were responsible for this web site. It should be the web site reflects their backgrounds and work experiences. In general the ideal is to achieve a balance from all three points of view so the end result is a web site that really works—from the user's perspective (Kochtanek, T. R. , Matthews, J. R., 2002).

An ideal website offer access to the library OPAC and possibly access to other electronic resources accessible through the library It provide basic information about the library, including its location, hours, upcoming events, and so forth. It may also provide access to

other community-based resources. A library web with its link provide more than simple information about the library and access to the library's Web OPAC too in design matter(Kochtanek, T. R. , Matthews, J. R., 2002).

2.8.6. Ease of use

Ease of use. Expect to find a search box on the home page. Would like a browse option to help select subject/keywords, particularly if an initial search failed to retrieve any results. Could not find how to refine a search in the brief record page. Delicious/saving search terms for re-use would be useful but prefer to be able to do from within Web OPAC's (Craven, Jenny ... et al., 2013).

2.9. Related works

Research was done by Umarani, Asha et.al...(2016) in their study on the title "Usability testing : study of three WEB OPACS from three different countries In view of this, the present study of usability testing of three Web OPACs from three different countries, was undertaken. A common list of tasks, to search the specific information on Web OPACs, was designed. Users were asked to perform these tasks using browse, basic and advanced search facilities of three Web OPACs. Survey method was used for data collection. Pre and post tasks questionnaires were distributed among users, both from Library and Information Science (LIS) department and other departments, then after analyzed the collected data the result that indicated the overall satisfaction about the design of the Web OPACs of Michigan University and Lancaster University among the respondents, but Goa University was found to be not so satisfactory. Further, respondents having LIS background could search these catalogues easily while others with no/less computer literacy, required personal help Umarani, Asha et.al...(2016). Therefore, The findings also strongly point out that, computer background and experience were the deciding factors in usability testing, focusing the necessity of training to be given to the users in computer literacy and information retrieval of the Web OPACs.

Due to the increase in web technology, designers in user-interface industry compete in making different designs to allow ease-of-use of these interfaces so that users can have access to information they need. Yet, most of the designs of OPACs' interfaces were not that

much effective in helping the users during their search for information. Some interface designs in university libraries' OPACs were less user-friendly and would not allow interactivity with the user during search sessions rendered them less effective, inefficient and bring low satisfaction on users. Libraries' Online Public Access Catalogs (OPACs) were one of the highly visible end user searching tools. Online catalog user studies have revealed, among other findings, that catalog users have the most difficulty with information searching and place the highest priority for improvements on various information search enhancements Klein, (2003),.

The OPACs allow users to access resources of libraries, publishers, and online Klein, (2003). OPACs can be accessed by from anywhere in the world, even from the palm of their hand. According to Angara, & Jagtap, (2008)., this new generation of OPACs also incorporates advanced search features and new designs from other types of IR systems, such as allowing users searching OPAC and online databases via OPAC interface. Most of OPACs interfaces were designed to minimize online connect time and printing options Angara, & Jagtap, (2008). It is therefore expected that, a user-friendly designed interfaces would have for instance, a simplified menu-driven interface utilizing off line storage of search strategy, automatic logon procedures, and software-controlled navigated searching techniques (Anglo-American cataloguing rules 2nd revised ed. 2002).

Search and retrieval of library materials has become easy due to OPAC. But it has been observed in some instances, that users were not coping with this change. There seems to be two reasons for this. Firstly, some users lack computer knowledge and hence were reluctant to accept the change and secondly, the designs of the interfaces of some systems were not user-friendly Brown, (2006) and Craven, et al, (2013) observed that personal and extended help is possible from library staff to the users to search OPAC effectively within the library. But it becomes difficult to provide such a help to online users. Therefore, it becomes essential to design user friendly OPACs and to test them for usability on a regular basis.

Usability study is a means for measuring how well people can use some human-made object (such as a web page, a computer interface, a document, or a device) for its intended purpose. Usability testing tries to find out 'user-friendliness' of the system, which is obviously subjective. Repeated user interviews, surveys, video recording of user sessions, and other

techniques can be used for this purpose. Apart from these, technique of task analysis also can be used where in, certain tasks were assigned to the users and observations were made and further analyzed .The academic libraries OPAC user's manifest special and unique needs and problems during their searching for information. Few user studies could be located which focused exclusively on how user-interfaces may have different impact to different categories of university library user communities Syed, C. (2011).

Kan, & Poo, (2005) conducted a usability study of California Institute of the Arts, in which Library OPA C to identify “causative factors determining catalog user success in finding in formation, user attitudes to catalog organization, and user ability to navigate the catalog” These researchers had participants conduct four different kinds of searches, took observation notes, and then had participants answer evaluative questions about the catalog.

Neiva,(2017) conducted a protocol analysis study to determine the usability of the Pennsylvania State University Library Participants were to complete five structured tasks using the catalog and were to tell observers exactly what they were thinking while they completed each task. Researchers found that the use of internet search engines has had a profound effect on the way that library patrons try to use and the expectations that they have for library OPACs. Because library OPAC's were not necessarily designed to work in the same way as internet search engines, this created some problems for participants and highlighted areas of the catalog that could be modified to help users search more effectively Neiva, (2017).

Ogun, In et. al...(2017) conducted their study with the title “Factors affecting online public access catalogue provision and sustainable use by undergraduates in two selected in Ogun and Oyo States, Nigeria. This study adopted the survey design of ex-post facto. Multi-stage, simple random and proportionate allocation sampling techniques were used to determine the sample size of the population. A total of N=209 of the sample size were drawn from the population using validated survey instruments for data collection. Its data sources included pre and post assessments with Likert- type of scale and open ended questions. Findings indicated that there were significant relevant relationships between the variables of OPAC provision and OPAC sustainable use. The findings suggest the use of principle of least effort model in the study of OPAC design. In the area of practice, the findings highlight the importance of OPAC use, ways of improving OPAC provision and sustainable use and

providing individual-level related training to ICT skills so as to help undergraduates harness the full benefits of OPAC. Therefore, this study implies to enhance the users' capability of sustainable use with the OPAC system effectively.

Fabunmi, O. M. & Asubiojo, B. O. (2013), study investigated the “awareness and use of Online Public Access Catalogue (OPAC)” by students of Obafemi Awolowo University, Nigeria.. Then which revealed that 68.7 % of the respondents were aware of the OPAC services; students who were aware of the library OPAC and did not use it to access library resources were statistically significant ($\chi^2 = 82.073$; $df = 2$; $\alpha = 0.001$); 23.8% of the respondents used OPAC independently; only 3.2% of the respondents accessed library resources from their hostels, 0.2% access it from homes. Similarly, majority of the respondents lacked information searching skills while lack of awareness, irregular power supply, network failure and inadequacy of computer terminals designated for the use of OPAC and were among the problems identified as factors the use of library OPAC. Therefore, the study concludes that majority of the students used manual catalogues to access library resources due to lack of awareness, skills to use OPAC systems problems encountered during usage. Hence, the users have not been making effective and efficient use of the library OPAC. Therefore, the researcher recommend that the Library should create more awareness and effective education for students at various levels to ensure maximum utilization of library resources in this University. Hence, the above revised review literature help the researcher to get information and have to scale up his experience's from the previous findings on overview of OPAC software, the definition of usability, usability checklist, usability components and related works. On the basis of the information that obtained from the above reviewed points, the present study designed and the finding of this study cross-checked with the previous related works to confirm the similarities and dissimilarities of the findings.

CHAPTER THREE

METHODOLOGY

3.1. Study Area and Study Period

There are 41 universities established in different parts of Ethiopia that have been authorized by the ministry of education. According annual statistics of the ministry of education, all universities are classified in to 3 categories based on their establishment period. Ten were relatively older categorized in 1st generation, while the remaining 11 and 17 universities were established somewhat later and categorized as 2nd and 3rd generations, respectively (www.aau.edu.et & www.aastu.org.et).The present study conducted in two selected different generation universities of Ethiopia, AAU (Addis Ababa University) from 1st generation, AASTU (Addis Ababa Science and Technology University) 2nd generation. They are all also have OPAC and infrastructure for their users to access the OPAC (online public access catalogue). This is mainly due to the fact that both universities have nearness to one another for data collection within the assigned time and limited budget and the researcher also believes to get necessary information's about the usability level of OPAC system from the above institution in the selected cases. The researcher used for the study is descriptive study design with mixed method which employed both quantitative and qualitative research method to gather adequate and relevant data on the actual usability level OPAC's system in the selected universities. Questionnaires and systematic observation is used as quantitative method and interview. Using mixed research can neutralize or cancel the biases of any single method, and it is used as a means for seeking convergence and integrating qualitative and quantitative data (Creswell, 2009).

3.2. Population of the study

The study populations are targeting the AAU (Addis Ababa University and AASTU (Addis Ababa Science Technology University). According to Registrar office and official website data the population of each universities post graduate students and librarian (professional staffs') data in AAU, and AASTU respectively are shown in Table 3.1 which indicated 3682 are the total study population; actively engage in research data collection method.

Table 3.1: Total population of the study

Name Institute	Types & No. of Study population		
	Post Graduate Students	Lib.& Info. Scie. Professionals	Total Study population
AAU	2586	300	2886
AASTU	750	46	796
Total	3336	346	3682

Source: based on website and asking human resource (2017-18).which where AAU and AASTU universities

3.3. Sample Technique and Sample Size

3.3.1. Sample Technique

The sample techniques were purposive and simple random sampling employed to select the study sample. Purposive sampling refers to targeting a group of respondents believed to be reliable or useful for the study (Robson, 2002). It was mainly used to collect focused information from typical and useful cases. In order to get appropriate representative data from each sample or sample group (strata), the research used Proportional stratified sampling techniques at the time of data collection since it is appropriate where there is stratified population and the strata have different size in number of members.

In this study, purposive sampling was used to select the study sites library directors and IT technicians for interview that the researcher believed were resourceful for the study. Simple random sampling technique was used to select samples from students, academic staffs, librarians and IT technicians. A simple random sample is obtained by choosing for interview to ensure that respondents from different universities were equally considered. In such a way that each unit in the population has an equal chance of being selected. Therefore the

researcher believed resourceful for the study. Hence simple random sampling technique is used to select samples from post graduate students, professional staffs (librarians) and library ICT technicians.

3.3.2 Sample size determination

The data collected by the researcher from two universities: Addis Ababa University has a total of 2886 and Addis Ababa Science Technology University 796, postgraduate students (users) learning as a regular student in (2017-2018) academic year in the two universities. The sample size was determined by using the statistical formula given below with the appropriate sample size confidence level = 95% and margin of Error = 5%. Having the population of each university the total sample size was determined using (Kothari, 2004) formula as follows:

$$n = \frac{X^2 * N * P * (1-P)}{(ME^2 * (N-1)) + (X^2 * P * (1-P))}$$

n = sample size

x= chi-square for the specific confidence level at one degree of freedom

N = population size

p= population of proportion

ME= desired Margin of Error

The sample size should be:

Whereas: x=1.96 N= 3682 P= 0.5 ME= 0.05

Based on the formula $n_o = 316$.

$$n = \frac{n_o}{1 + \frac{n_o}{N}} = 288 \text{ (sample size).}$$

Sample size allocation (proportional allocation for AAU and AASTU University)

$$n_1 = \frac{n * N_1}{N} = n_1 = \frac{n * N_1}{N} (288 * 2886) / 3682 = 225 \text{ for AAU University}$$

$n_2 = \frac{n \cdot N_2}{N} = (288 \cdot 796) / 1774 = 62$ for AASTU University. Therefore, the totals of (AAU and AASTU) universities sample size were 287.

3.4. Data Collection instrument

The instruments used to collect data for this study were questionnaire, interview and systematic observation. The qualitative data were collected using interview and observations. Data were collected by using both open-ended and close-ended questions, which were administered to randomly selected respondents from each university. This is because the questionnaire provides an opportunity for respondents to give frank and anonymous answers if not affected by the presence of the researcher (Moser & Kalton, 1997). Moreover, questionnaire has an advantage of enabling respondents to give their opinions independently (Sarantakos, 2003). Qualitative and quantitative approaches (methods) are also used to collect and analyze data. Observation were employed by the researcher for the usability of selected universities OPAC's system and the observation check list for the study.

3.5. Data source

There were two sources of data which includes primary and secondary data. Primary sources of were collected from the sample respondents and the secondary data were collected from the documents through document observations. The questionnaires included several types of questions: nominal, dichotomous and Likert type items. In nominal-dichotomous items the researcher asked the respondents to categorize them according to their place (university), educational status or work position.

3.6. Data Analysis

After the required amount of data was received from the field, it was reviewed for any inconsistencies, organized and then analyzed. Data had been analyzed using both descriptive and inferential statistics, so as to draw meaningful inferences about the problem under investigation. Quantitative data were analyzed by using descriptive statistics such as (frequency, mean and percentage).and inferential statistics by ANOVA (Analysis of variance), regression model, analysis applied with the use of statistical package for the Social

Sciences (SPSS) version 20. Percentages, charts, tables and One-Way-ANOVA used to present the finding.

3.7. Study variable

The following independent and dependent variables are identified for analysis the data. Dependent variable is a variable that is affected or explained by another variable whereas an independent variable is a variable that causes change in another.

I. Dependent Variable

The dependent variable of this study was **usability** of OPAC system to student.

II. Independent variable

Independent variable: attitude of users to operate and access the system, skill of user to operate and access the system, efficiency of the system to execute the required information, services: facilities/learn ability/, contents, navigation simplicity, interface design-user-friendly and satisfaction, etc. are factors of usability. These usability factors can serve as a guideline and can also be used for measuring usability level of universities library OPAC system.

3.8. Ethical Consideration

Ethical issues should be, an important consideration in the design and conduct of research (Wilkinson, 2000). It does not involve people without their knowledge or consent. It keeps the privacy of each participant. The information gathered will be used only for the purpose of conducting this research. All activities in this study were conducted in a legal way. It was conducted by taking and distributig the permission letter from Natural science college, Information Science department of Jimma University during the data collection period. Therefore, it is important that possible ethical issues were identified, prevented, and reviewed as best as possible prior to, during and after the study. Ethical principles provide direction to the possible issues not answers.

CHAPTER FOUR

RESULTS AND DISCUSSION

4. Results

4.1. Response Rate and Socio-demographic information

The feedback of the respondents taken according to Kenate, D. and Gojeh, et al... (2013), argue that a decision on the respondents ranking of the results (variables), into percentage, mean of responses were guided by the Likert's scale: 1.0 -1.49 very low, 1.5-2.49 low, 2.5-3.49 medium, 3.5-4.49 high and 4.5 - 4.99 very high.

Table 4.1 shows the total number questionnaires distributed and collected from Addis Ababa university and Addis Ababa Science and Technology University.

Table 4.1: Number of distributed and collected questionnaire

No.	Name of the institution	Number of Questioners		
		Distributed	Collected	Percentage (%)
1	AAU	226	189	83.6 %
2	AASTU	90	50	55.6 %
Total		316	239	75.6 %

According Table 4.1: the total numbers of distributed questionnaires were 316, out of which 239 were filled and returned which shows 75.6 % of the questionnaires. The entire 239 questionnaires were filled properly and found appropriate for the analysis of this particular study. In short, 55.6 % and 83.6 % of questionnaires were collected from AAU and AASTU respondents respectively.

4.1.1. Socio-demographic information

Respondents University					
Category		Frequency	Percent	Valid percent	Cumulative percent
	AAU	189	79.1 %	79.1 %	---
	AASTU	50	20.9 %	20.9 %	100.0%
Sex					
	Male	182	76.2 %	76.2 %	---
	Female	57	23.8 %	23.8%	100.0%
Respondents academic qualification					
	MSc/MA	207		86.7%	86.7%
	Ph.D.	32		13.4%	13.4%
	Other	239		100.0 %	100.0 %
Respondent position					
	Academic staff	219		91.6%	91.6%
	Admin.(Technical) staff	20		8.4%	8.4%

Table 4.0-1 demographic characteristics of respondents

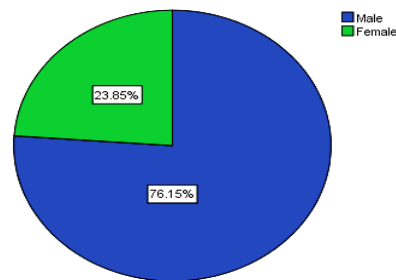


Figure. 4.1.1. : Pie Chart of Socio- demographic information (by Gender)

According to Table 4.1.1 and Figure 4.1.1 above, the majority of participants were males 182 (76.2%) and females 57 (23.8%). Similarly, majority 207 (91.6%) of the respondents have MSc/MA degree where as 32 (8.4%) of respondent have Ph.D. degree holders. As described on the above Table 4.2, 219 (86.8%) of the respondents were academic staffs and 20(23.2 %) of the respondents were administration staff.

4.1.2. Frequency of OPAC users at higher learning institutions

The respondents reply about how often they visit the OPAC system in higher learning institution is depicted in the next table 4.3.

Table 4.3: Frequency of OPAC use

Frequency of OPAC Used by users		Frequency	Percent (%)
	several times a day	21	8.8
	Once or twice a day	57	23.8
	2-3 days a week	63	26.4
	Once a week	27	11.3
	Rarely	71	29.7
	Total	239	100.0

According the above table 4.4, the interpretation results and the discussions were based on the purpose of OPAC users in the selected university libraries. Based on this illustration 80 (33.5%) of the respondents were used the library OPAC to get bibliographic information, the second item respondents ranked 20.1% and they were used OPAC to know the location of the requisite documents, on the third item ranked 31.8%, respondents were used OPAC to identify the availability of requested documents and 14.6 % of respondents were used OPAC to know whether requisite document issued or not. Therefore, the survey data was revealed that of respondents used library OPAC when they need bibliographic information rather than as a regular habit.

4.1.3. Searching Strategy in OPAC

Items		Frequency	Percent	Valid Percent	Cumulative Percent
Search Tasks	simple/basic/ search	111	46.4	46.4	46.4
	advanced search	18	7.5	7.5	54.0
	I used by default	64	26.8	26.8	80.8
	BySimple & advanced	46	19.2	19.2	100.0
	Total	239	100.0		

Table 4.4: Searching Strategy in OPAC

The options are given to the postgraduate students to choose which searching strategy function they prefer for the purpose of information retrieval system of OPAC database and for others opportunities. According to Table 4.5 the respondents chosen mostly 46.4% value on simple/basic search strategy, 26.8% of the respondent selected and used by default (Simple or advanced) to satisfy their need, 19.2% of them chosen simple and advanced searching strategy from the other opportunities, and then the respondents selected the advanced search strategy value. Therefore, according to the respondent's response, the highest frequency was 46.4% which is simple/basic/ search strategy for information searching purpose, but the other searching strategy total mean ranked on low.

4.1.4 Level of online public accesses catalog awareness of users

In order to observe the awareness or knowledge level of the respondents for OPAC services question was presented to Addis Ababa Science Technology universities library students and professional staffs. Large number of respondents indicated that they are familiar with library OPAC data base system. The responses were summarized under the table below.

No.	Items	Name of University	N	Mean	Std. Deviation	Std. Er. Mean	DN
1	Library provide user education	AAU	189	2.42	.619	.045	L
		AASTU	50	2.36	.525	.074	L
2	Can identify location of information materials	AAU	189	3.34	.679	.049	M
		AASTU	50	2.96	.699	.099	M
3	OPAC features helps to browse contents	AAU	189	3.19	.776	.056	M
		AASTU	50	3.06	.767	.108	M
4	Provide ease of access to library holdings	AAU	189	3.34	.794	.058	M
		AASTU	50	2.58	.642	.091	M
5	Implementing searching strategies for navigation OPAC	AAU	189	2.75	.705	.051	M
		AASTU	50	2.34	.519	.073	L

Table 4.5: Group Statistics for level of OPAC services' awareness

According to Table 4.5 above shows, the options given to the postgraduate students (users) were rating to identify the level of OPAC services awareness of the users on different kinds of tasks applicable differences between groups (two Universities) as follows: The respondents were described the level of awareness of users 'for OPAC services to comparing the similarity and the difference of the group statistics result in which the respondents can identify the mean and standard deviation accordingly. On item one, regarding the degree of library services, the respondents of AAU and ASTU said that library provides low services. To conclude in this regard, the two universities libraries render inadequate services to users.

4.1.5 The OPACs' services and users' Satisfaction in the HLI library

Indicators	Item	Code /Rating/										Central		
		SS		S		LS		DS		SDS		Tendency		
		<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>F</i>	%	<i>f</i>	%	<i>X</i>	Std.	DN
Accessibility	-OPAC system access /retrieve used to check due dates for borrowing the needed information materials	23	5.4	104	43.5	48	32.6	42	17.6	22	9.2	2.78	.624	LS
Search Strategy	-OPAC service is support users to use different search Strategy etc.	20	37.0	44	18.4	65	27.2	87	36.4	23	9.6	2.34	.686	DS
Availability	-The OPAC system de the availability of formation materials	21	8.8	73	30.5	86	36.0	47	19.7	12	5.0	2.72	.642	LS
Navigation	-Navigation of OPAC system with search box and function	11	4.6	92	38.5	68	28.5	34	14.2	29	12.1	3.04	.631	LS
Sorting Capability	-Sorting options in or outside database/other linkage	19	7.9	47	19.7	44	35.2	97	40.6	32	13.4	2.75	.643	LS
(Real-time) Circulation	-Real time circulation availability	14	5.9	86	36.0	67	28.0	44	18.4	28	11.7	3.62	.682	S

Table 4.6: Descriptive statistics Result on users' Satisfaction of the OPAC system satisfy

The study elicited data from the participants regarding the services provided by the system. The researcher asked the respondents to rate the questions on the base of the five Likert scale as follow: SS(5) Strongly satisfy, S(4) = Satisfy, LS(3)= Less satisfy, DS(2)= dissatisfy, SDS(1)= strongly dissatisfy satisfy.

According to Table 4.6. above shows, the descriptive statistics used to identify OPAC service to measure users' satisfaction levels by using five indicators; such as, accessibility, search strategy, availability, navigation, sorting capacity and circulation (real-time). Users were satisfied (m=3.62) by real-time circulation which show the satisfaction of the OPAC services in terms of the information retrieval system of the libraries to satisfy the need of the users; where as other respondents were less satisfied by accessibility, search strategy, availability, navigation and sorting capacity indicators which are used to measure users' satisfaction level. This result revealed that the satisfaction level of user's in library OPAC system from the whole post graduate students in the selected universities OPAC system vary.

Even if student's response shows that there is a good attempt on those points in which user's didn't satisfied library OPAC services even though most of the result revealed on less satisfied, with rank of 26.8% -61.5% more or less which was an indicator of the system drawback.

Accordingly, the above table , the mean value was 2.34 from selected universities result marked on dissatisfied the users of OPAC's system offered different problems in which identified on the two OPACs', with regard to the were ranked with the mean value 2.72 to 3.04 which implies less satisfied on information accessibility and availability, sorting capabilities and navigation of OPAC. On the other hand, the real-time circulation availability of resources ranked on the mean value was 3.68, which show the satisfaction of the OPAC services in terms of the information retrieval system of the libraries to satisfy the need of the users. The above result revealed that the satisfaction level of user's in library OPAC system from the whole post graduate students in the selected universities OPAC system vary. However, the respondents the whole results in above table in the 1st row were analyzed their expected average (mean): 2.78 and Std. deviation result was .624. In order to support the finding for the raised question in relation to types of common activities and types of

resources accessed by students, the students also asked to answer the number of times they spent on average for selected known (common) activities in their day to day OPAC services. As a result, the 19.2 following result 29.7 % was obtained.

4.1.6. Difficulties /barriers/ faced by library OPAC users' in the selected HLI

The study draws out the difficulties of OPAC services from the participants feedback by the following statistical analysis.

No	Items	Code /Rating/										Central Tendency		
		SDA		DA		N		A		SA		X	SD	DN
		f	%	f	%	F	%	F	%	f	%			
1	User Interface design (valid, visibility)	8	3.4	17	7.1	169	70.6	32	17.5	17	7.1	3.18	.633	N
2	OPAC system bibliographic database error	20	8.4	19	8.0	112	46.8	79	46.8	10	4.0	2.52	.616	N
3	Power Failure	15	6.3	30	12.6	40	16.7	135	56.5	19	8.0	3.71	.591	A
4	Internet availability	20	8.4	34	14.2	118	49.2	65	27.2	4	1.6	3.16	.731	N
5	System service and functionality	10	4.2	19	8.0	35	14.6	179	75.4	12	4.8	3.84	.497	A
6	Lack of knowledge or skilled person	12	5.0	16	6.7	65	27.2	128	53.6	18	7.5	2.22	.758	DA
7	Series Technical problems encountered	7	2.9	47	19.7	144	60.3	27	11.1	14	5.8	2.44	.775	DA

Table 4.7: Descriptive Statistics result on OPAC service Difficulties /barriers/ Issues

SA(5)= strongly agree, A(4)=agree, N(3)= neutral, DA(2)= disagree, SDA(1)=strongly disagree.

According to Table 4.7 above shows the descriptive statistics on the difficulties /barriers/ faced by library OPAC service users in the Ethiopian selected public Higher Institutions. The researcher asked the respondents to rate the questions on the base of the scale. From the total number of respondents, 46.9% to 70.6% i.e. an average percent rate is neutral value on user

interface design, internet availability, disagree on bibliographic database error and series technical problems (barriers) were encountered.

Furthermore, 53.6% (128) to 75.4% (179) rates were the highest percentage of the respondents agreed on the OPAC services difficulties like (Power interruption, lack of knowledge and system service and functionality. From this result the usability (functionality) or difficulties the OPAC that identified on the two universities automation system with the above analysis indicates that the higher learning institution OPAC services condition and difficulties were not suitable for their users.

However, the result as presented in Table 5 shows that some of the respondents agreed that the OPAC system provide a valid, and visibility user interface design for a clear and complete bibliographic information retrieval process to user with mean value 3.80, users of higher learning institution OPAC play an important role to give an effective services to the users' with mean value 3.84. And to the opposite the mean value was 2.22 lack of skilled man power have more of a negative impact for the overall services of OPAC. The second most respondent's response put on neutral and disagreed rank which then analyzed the data that show the difficulties /barriers/ of the system with the mean 2.44 and 2.52 were a bibliographic database error and Series technical problems were already mentioned in the statistical report of the study. These problems more observed and registered in ASTU library OPAC.

4.1.7. The Level of system Efficiency and satisfaction in higher learning institution on usability of OPAC feature

There are different factors raised in the following table to identify and measure the status of each factors on the usability of OPAC.

Indicator	Items	Level of system Efficiency and satisfaction										Central Tendency		
		SS		S		M		DS		SDS				
		<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>F</i>	%	<i>f</i>	%	Mea	SD	N
(1) Services facilities	Services/facilities - Interface with the Provision for the options such as: documents check	4	1.7	90	37.7	124	51.9	15	6.3	6	2.5	3.53	.628	S
(2) Navigation	Navigation : - provide user improve navigation speed more useful features	7	2.9	92	38.5	122	51.0	12	5.0	6	2.5	2.64	.599	M
(3) Content (Information Enriched)	Content- /Inform/ Enriched: - Access points search such as author/title, author Key word	10	4.2	30	12.6	36	15.1	153	64.0	10	4.2	2.43	.567	DS
(4) Efficiency	Efficiency: - Information accessibility efficient as required of users	5	2.1	36	15.1	153	64.0	58	24.3	9	3.8	3.02	.601	M
(5) Interface design	OPAC Interface Design :- -Screen Design is suitable for accessing	8	3.3	70	29.3	50	20.9	106	44.4	5	2.1	2.94	.944	M
(6) Satisfaction	Satisfaction: -The system satisfied the information need of the users from multiple database sources	2	0.8	51	21.3	123	51.5	56	26.4	7	2.9	2.97	.715	M

Table 4.8. The Level of system Efficiency and satisfaction on usability of OPAC

SS(5)= strongly satisfied, A(4)=satisfied, M(3)= Moderate, DS(2)= disagree, SDS(1)=strongly dissatisfied.

According to Table 4.8. above, exhibits overall satisfaction level of users in usability of OPAC services. It highlights that out of 239 users less than one fifth of the users (4.8 %) were Strongly satisfied with OPAC use, almost (58.9%) or above two fourth the respondents were satisfied and one-third (25.9%) moderately satisfied with OPAC use. Only 22.3 % were dissatisfied with OPAC use and 3.1 % were very dissatisfied with OPAC use. Evidently, it is clear that only majority of users is satisfied with OPAC working in information resources retrieval services.

Questions to determine the factor that affect OPAC usability were asked to respondents of each two universities. Indicated that on the 1st item is possible to find what I want within a reasonable time with the mean value 3.53 with Services Facilities (Learnability) I think it is easy to learn and understand the OPAC facilities and services was high (satisfactory) where the system is actively interact with the users. The mean value 2.64, 2.94, 2.97 and 3.02 were laid on Medium value the items accordingly presented as follows: The 2nd item was improved the navigation task, they provide user guidelines or tutorials that help the navigation process more smooth and simple, the 3rd item in the usability of OPAC was easy to understand its content that can be used properly to search and handle information through the internet service in the system database and the 4th item indicate the usability level of OPAC Efficiency -in the information accessibility, Interface usability, search task accurately perform, the 5th item that was related to the usability level of the existing OPAC Interface Design had been different features, well screen design and its searching tasks was accurately perform in the library system. While-then the 6th item was identifying the satisfaction level of usability in which users were pleasant to OPAC, in retrieval of information resources in the perspective of respondents of the two-university library OPAC services

*

Indicators /Items/	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.707	.434		6.234	.000
-Services/facilities:	.146	.064	.148	2.302	.022
-Navigation:	-.140	.067	-.135	-2.101	.037
-Efficiency:	-.081	.066	-.079	-1.239	.217
-Content:	-.029	.071	-.026	-.409	.683
-Opac Interface Design:	.099	.057	.113	1.741	.083
-Satisfaction:	.126	.056	.146	2.247	.026

Table 4.9: Regression analysis output/result on Factors of Usability OPAC Model.

a. Dependent Variable: Usability

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.337 ^a	.114	.091	.591

a. Predictors: (Constant), Usability: Users are pleasant to Opac, system satisfied information need, Content: Information Enriched, Opac Interface Design: Interface different features, searching task, screen design, Efficiency: Interface usability, search task accurately performs,, Navigation: Ease of use, improve navigation, provide users tutorial, Services/facilities: Interface the circulation, document check out, external links

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	10.391	6	1.732	4.958	.000^b
Residual	81.040	232	.349		
Total	91.431	238			

a. Dependent Variable: Usability

b. Predictors: (Constant), Usability: Users are pleasant to Opac, system satisfied information need, Content: Information Enriched, Opac Interface Design: Interface different features, searching task, screen design, Efficiency: Interface usability, search task accurately performs, Navigation: Ease of use, improve navigation, provide users tutorial, Services/facilities: Interface the circulation, document check out, external links

4.1.8. Regression analysis & output/result: in Regression table, A NOVAs and Summary-Models.

According Table 4.9 and Table 4.10 the above model summary shows that the regression model can explain 33.7% of the variance in the dependent variable. When adjusting the number of estimated parameters and study population, the model can contain 11.4% of the dependent variable's variance. The regression analysis the results of this study indicate that the relation between Services/facilities and usability is significant. The regression result shows Services/facilities have $\beta = 2.302$, $p\text{-value} = .022$. The results prove that, that there is relationship between the two variables Services/facilities and usability of OPAC system. The results revealed that there is a positive relation between services/facilities and usability of OPAC.

The regression analysis results show that the association between OPAC. navigation function and usability of OPAC. is not significant. The regression result shows organizational culture has $\beta = -2.101$; $p\text{-value} = .037$. The results prove that, there is a negative relationship between OPAC navigation process and usability in this study. This means the p - value of navigation process is less than 0.05 so, in this study navigation process has affected by the dependent variables. The results of this study revealed that the association between the efficiency of OPAC and usability is no significant. The regression result shows efficiency of OPAC have $\beta = -.207$, $p\text{-value} = .003$. The results prove that, that there is negative relationship between the efficiency of OPAC and usability.

The regression analysis results show that the association content and usability is significant. The regression result shows interactivity and multiple language support has $\beta = -.409$; $p\text{-value} = .683$. The results prove there is also a negative and no significant relationship between content and usability in this study which means the results prove that, there is no relationship between content and usability in this study. This means the p - value of content is greater than 0.05 so, in this study there is no effect on the dependent variables. The regression analysis results show that the association OPAC Interface design and usability is significant, shows that in this study the regression analysis shows results of ($\beta = 1.741$, $p\text{ value} = .083$), implying that there is a positive and significant relation between usability of OPAC system and it inter face design. And the regression analysis show that there is

significant and positive relation with the beta = 2.247, p-value .026. The results revealed that there is a relation between service satisfaction and usability.

4.2. Qualitative data Analysis and Result

4.2.1. Analysis on the Interview

The researcher carried out interviews with AAU and AASTU universities library Directors and technical processing staff. Totally six persons participated in the interview. The professional library staff interviewee report is as follow: -

The primary question for library professional was how long you have been in your University library in this position? The interviewee said that they have been served in library seven to twelve years in two universities libraries. The next question was when did your University library start OPAC Services? The respondents explained that “as long as KOHA system, it was started the OPAC services integrally implemented in 2007 at AAU and 2011 in AASTU libraries.” In relation to this, what type of Software your libraries used for OPAC was another question and the respondents said “KHOA ILS open source software in two University Libraries.” The researcher asked the interviewee how you provide OPAC system to access the users easily and they said that “we were provide users’ with deferent ways and mechanism to access the OPAC system, some of the mechanisms were: to give orientation, by providing awareness to user about the library services in short or long-time schedule when it is necessary”.

The interviewer posed question “how do you see/measure the service of OPAC system to the users?” The interviewee said “Through users ‘survey or assessment connected with the system task effectiveness and satisfaction of users’ in general”. Moreover, is there a mechanics that you know the efficient and effectiveness of OPAC services and satisfaction of users? was the question presented another interviewee. The respondent said they have no a standard measuring mechanism of the services. But some of them were simply communicating the users to give their opinion about the efficient and satisfaction the whole services of OPAC’s system in the two HLI libraries. Similarly, weather there is a problem interims of human and materials resources in related to OPAC service or not was question to the interviewee and they said that we haven’t a significant material and human resource

problems in AAU, whereas in AASTU, but a little bit there is scarcity concerning skilled human resources and technical support to improve and upgrade the services with expected standard to achieve the goal of the HLI OPAC Service. To identify the effect of internet, the interviewer forwarded what are the impacts of internet in accessing OPAC in your library? The respondents have been identified two types of impacts occurred in the use of internet. Those were: A positive impact of users' having a quick and wide accessing opportunity of the internet and other portal services. The other is the negative impact was the network and electric system break down problems. In general, all of the University library holdings incorporated into the system.

What is the stage of development in your University libraries reached in access OPAC service to the users? This question was presented for both AAU and AASTU persons, and according the library professional staff respondents were reveal, in which the responsible persons in the HLI have to improve the indicated system development such as preference towards Google like searching interference, lack of integration with other library system e.g. digital library, journal system. In general, it seems good.

Regarding the type of challenges that affect the usability of OPAC's Systems, the respondents' feedback for using OPAC outside the proxy, the interruption of internet and intranet were occurred for a long time. In addition to these, an electric power failure and the absence of a responsible person to control the system error/down occurred mostly in the AASTU library system. Lastly, respondents explain their future plan how to improve (upgrade) the existing system to give quality services. They said that we will design plan to integrate works, different library services (systems) with the existing system to enhance and improve the overall services of the library OPAC to met the information need of library users of the two universities.

Table 4.12: Observation Check List of OPAC

Evaluation table (Make it thick with this “√” mark on the space provided)

No.	Item /Tools/	AAU						AASTU						
		Availability			Efficiency			Availability			Efficiency			
		Enough	Not enough	Never	Enough	Not enough	Never	Enough	Not enough	Never	Enough	Not enough	Never	
1	OPAC system display the availability of information materials on assigned library	√				√				√			√	
2	OPAC system effectively accessible the information of author, Title, Subject, call no., etc..	√			√				√				√	
3	Contents of OPAC give adequate bibliographic information to the users	√			√				√				√	
4	In OPAC user interface searching strategy functional (simple & advanced search)	√			√				√				√	
5	The library Patron’s has the opportunity to navigate the system to get accurate information about the status of resources in the loan database		√			√			√				√	
6	OPAC services saves their time, energy than manual card catalog searching system	√			√			√				√		
7	The computers in the university were sufficient to use OPAC services efficiently.	√				√		√					√	

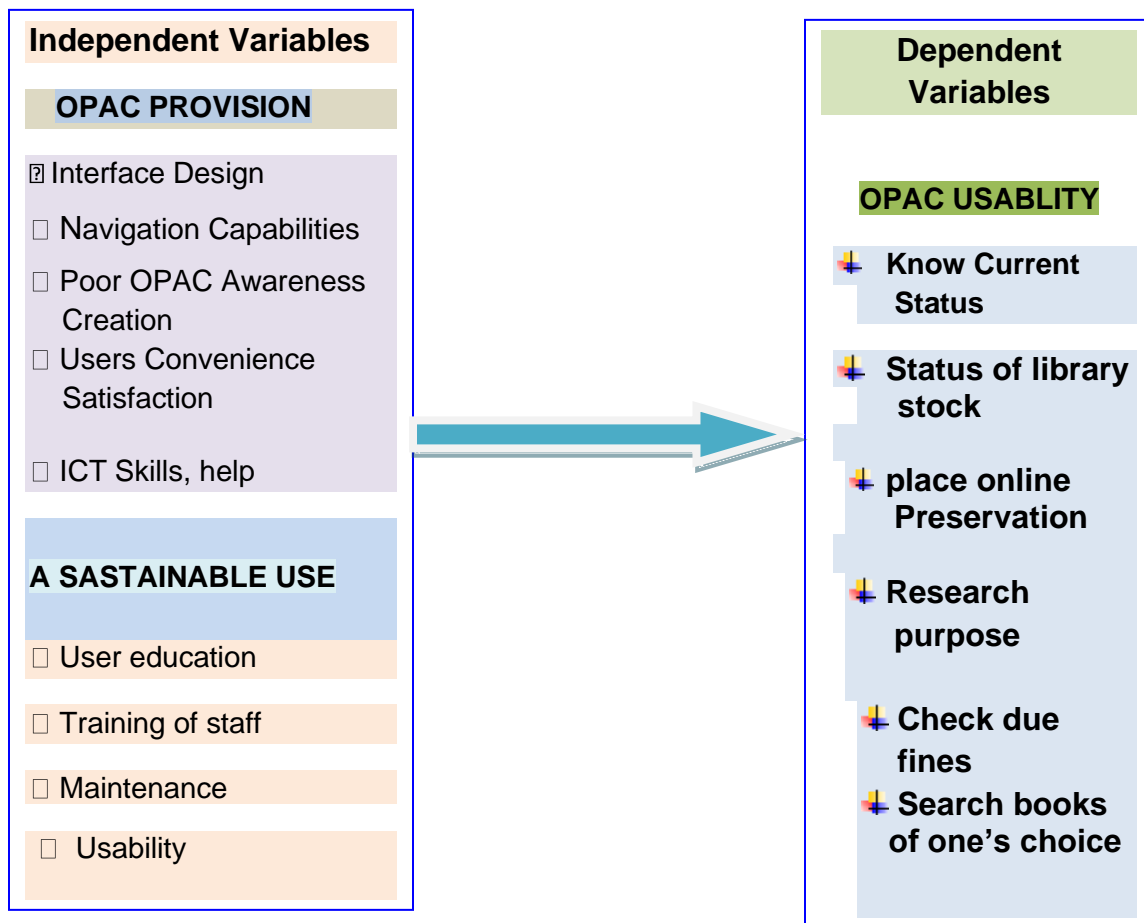
4.2.2 Analysis and Result of the Observation

The researcher also carried out observation checklist with two selected universities. Such as the availability and efficiency of Library OPAC system services, computer/server internet network availability and type of OPAC system speed from the two universities. It was clear that the entire university used internet and the OPAC service for providing services for their users. From AAU and AASTU the researcher observed that the computers available in the university were sufficient. In addition, the researcher accepted the reality that the universities professional & academic staffs through the internet that could be accessing OPAC services anywhere inside the university campus, but the services by itself not sufficient for the users. Because the web services limited or depend on the institution Internet band width distribution among all universities were varied. The other point the researcher observed that from the two selected universities, those indicated most of the users' (students) have no awareness about OPAC usability and services. In addition to these, due to the OPAC database error and skilled man power problems more of in AASTU library OPAC in which practically observed while this assessment taken in their campus. Other detail summarized the respondent feedback and the observation result carried out by the researcher into two selected public universities based on OPAC usability evaluation criteria such as navigation, content and interface design and etc. factors of this study.

4.3. Proposed Library OPAC usability Frame Work

In order to design the new proposed model, a careful study on key usability factors for websites was done by using questionnaire, previous related works in higher learning institution web-OPAC system evaluation and the usability factors in the reviewed OPAC models was made to identify necessary factors that affect on usability of higher learning institution OPAC system and sub characteristics. The usability factors were rearranged to group factors with an equivalent semantic meaning into one category by eliminating existing repetitions and different factor names.

Figure 4.2: Conceptual Frame Work on Usability of OPAC



Source: <https://www.researchgate.net/>

4.3.1. Conceptual frame work

The above conceptual framework was used to guide the research questions, hypotheses, and the research methodology. The conceptual framework identified two independent variables (OPAC provision and sustainable use) and one dependent variable (OPAC Usability).

The principle of least effort by is used as the theoretical framework of this study. The principle of least effort states that people prefer to use accessible, convenient, and physically close sources because they want to minimize their effort when obtaining

information from these sources. Information seeking behavior stops as soon as minimally acceptable results are found. It assumes that information channel use is a function of user awareness. This revealed that when knowledge of a source, its contents and capabilities increase, the use of that source tends to increase. The author concludes that humans strongly prefer to return to the sources that tend to increase they had used even when the information is of lower quality rather than find new information sources.

4.3.2 Theoretical framework

Findings of these two analyses portray the status of OPACs of the selected samples at the time of research study. Perception of these studies confirms that the developmental activities in the cataloguing world are in a linear fashion, but this approach is not adequate to revitalize OPAC. A multifaceted approach should be categorically adopted to change the landscape of the catalogue. This section proposes a new framework with multifaceted approach which includes the shortcomings found in the two part of analysis (Dominic, 2013).

4.3.3 Implementation Procedure

Introducing new rules and fields in the cataloguing standards will help to add some of the above features. However other required features can be integrated with the help of the advanced computer technologies in the design stages of OPACs. A versatile OPAC can be developed with the use of Web technologies such as mark-up languages, client-side scripting language(s), server-side scripting language(s) and RDBMS. The user interface design could be done with the use of mark-up and client-side scripting languages such as HTML 4.1, XML, Cascading Style Sheets (CSS), jQuery, AJAX, etc.,. Choice of RDBMS is based on the existing database system used in the current OPAC applications. It could be combination any of the following such as Oracle, MySQL, SQL Server, DB2, etc (Rahman, 2013).

4.3.4 Additional Features for Information Searching

Information searching capability is the most fundamental quality to judge the performance of OPAC in line with other information mediation tools. Additionally, it paves the way to maximize the utilization of all resources and to obtain the information beyond its limit. More attention is to be paid to make OPAC as a prevailing information searching tool to compete with Amazon, Google and other similar kind of products. Library professionals must be able

to identify the relevant open sources for the core subjects of their parent organization to incorporate in the OPAC. Directory of Open Access Journals, BENTHAM OPEN and High Wire Press are some of the examples for open sources (Dominic, 2013).

4.3.5 Good Impressive Interface

“Most of the designs of OPACs interfaces are not much effective in helping the users during their search for information. Interface designs in OPACs are less user-friendly and would not allow interactivity with the user during their search sessions. OPACs are one of the highly visible end users searching tools”. The interface is playing a crucial role in attracting the users towards the library catalogue and should be grafted as attractive, responsive, intuitive, concise and an efficient one (Winnie, T. 2009).

4.4. Discussion

4.4.1 Usability of higher learning institution OPAC

The review of discussions of the findings of this study reveals that, the working of academic libraries users has changed significantly and most of the libraries in the selected Universities are now intended to follow web based OPAC in place of traditional catalogue. The review of this study findings includes the methodologies of studies on OPAC by using descriptive survey method, OPACs technology based on various features, applications, advantages, characteristics of OPAC .So this research study meets the expectations of OPAC users.

The demographic status of respondent`s shown in terms of gender, education and qualification. The Table on the demographic part indicates that more than 76.18 % of the respondents were male and the majority of the respondents 76.18 % have educational qualification of master and bachelor degree. The University ICT system developer now is required to embrace this improvement and provide information resource services. The services in terms of internet, electric power, and the library online providing in AAU and AASTU University have similarities. But regarding the problems in internet using and band width distribution in the selected universities were varied. Similar findings have been indicated by Okiki (2011) slow connection and electricity breakdown problems interrupt the OPAC and digital services in most of HLI of Ethiopia, so these were stated by the respondents as the most encountered problems.

Relation between usability of OPAC systems and the independent variables in this research finding indicated that there was a significant relationship between usability of OPAC providing by AAU and AASTU. This effect was perceived by higher learning institution users (Postgraduate students & Professional staffs (Kumar R. , 2018). Hence usability of web-OPAC in higher education has a significant effect on the use of real, accurate information resources in the content and on the navigation of the OPAC system.

According to the regression analysis results of this study reveals that the relation between Services/facilities and usability`s are significant (important). The regression result shown Services/facilities have $\beta = 2.302$, $p\text{-value} = .022$. The results proved that, there is a

relationship between Services/facilities and usability of OPAC system. The results revealed that there is a positive relationship between Services/facilities and usability's of OPAC system.

The regression analysis results illustrated that the association between OPAC navigation function and usability of OPAC is not significant. In this research study the regression result indicated institutional culture has $\beta = -2.101$; $p\text{-value} = .037$. The results proved that, there is a negative relationship between OPAC navigation process and usability. This means the p -value of navigation process is less than 0.05 so, in this research study navigation process has affected by the dependent variables. The results of this research study revealed that the association between the efficiency of OPAC in general.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

This final chapter contains the conclusion of the results, the researcher's recommendations and the future work will be mentioned as follows respectively.

5.1 Conclusions

Higher learning institution library OPAC service is one of the major areas of an academic information resources providing (retrieval) system, to its users in efficient way to achieve the educational goal of the country. To optimize the information retrieval services the researcher gave attention on basic problems the OPAC system. The problems furthermore are classified into the following major factors identified from the analysis of the results. We also come to the evident conclusion that the interfaces of the OPAC of the AAU & AASTU universities were not optimal for serving user needs, with apparent limitations in its design, a lack of screens for assistance, a deficient system of searching by subject heading, and very limited search options. Users have many kinds of problems performing subject and advanced searches in OPAC systems. A lot of users do not have the required knowledge and skills needed for effective utilization of OPAC, in which the users' have no sufficient/appropriate awareness for utilized OPAC as required the system, even though the overall difficulties of resources and infrastructures had impact (affected) the usability of OPAC: on dependent variables or the independent variables (factors) those are content, navigation, interface design, of OPAC directly or indirectly where the services provided. This article could help to indicate a possible improvement that can be made to OPAC system design. With developments in Internet and Web technologies, many of the proposed improvements can be instituted without major changes to the OPAC back end system. Changes can easily be made in the design of the web pages used as an interface to the OPAC. OPAC interfaces are playing increasingly expanded roles. They now provide access not just to records of books and journals held by a library but also to multiple library systems, to full-text documents and journal articles, and to databases and other resources on the Internet.

5.2. Recommendations

On the basis of the findings, the following recommendations have been made to optimize utilization of OPAC facility in the University library:

1. The study observed that the OPAC does not offer various essential features such as spell check software, quick search, new arrivals and book cover display facilities. Moreover these features, there is no provision for links to electronic sources. Therefore, it is strongly recommended that the said features must be incorporated in OPAC.
2. OPAC should have more user-friendly online help that may provide direction to users to start a search and to show next steps during a search. Users may expect a single search box (with a link to “Advanced search”) and may find it useful to have some means for browsing the subjects or keywords to help input a successful query.
3. To facilitate the users, the University library should organize user education programmers on the use of different techniques and strategies in retrieving information about the documents. The instruction programs may enhance user knowledge and basic skills for searching and using OPAC.
4. It is evident from the study that the users were not having basic skills of searching OPAC. Therefore, they needed the assistance of library staff near OPAC terminals for optimum utilization of this service.
5. Additional functionality, on the whole, related to further management of the information found, such as mark list, annotate, export, share lists and reuse of searches within the OPAC context

OPAC at present provides the user with a useful service. However, the changing environment for information access has meant that its users have new expectations of what constitutes a supported experience. The study’s participants again appear to have developed expectations of what systems such as OPAC should usefully provide and this relates to the personal use of the information found and to the use of system social networking capabilities in this context.

5.3 Future works

Regarding the future work, the research has raised some ideas and suggestions for future work that can be developed in further studies.

- The research suggested that the manager or designer of the University of higher learning Institution Web-based installation authorities should consider the most common usability factors / problems identified in this research in order to improve the overall usability of the university's web.-OPAC system.
- Further work may be carried out with more distributed governmental and private universities with different user groups are recommended for other researchers.
- In addition research should focus to design the framework for the possibility of using it to other sectors: like public and private books center, goods stores and other business organization to find out if it is appropriate,

References

- Angara, S. & Jagtap, V.(2008).Usability testing: study of three webs OPAC's from three different countries.
- Anglo-American cataloguing rules 2nd revised ed., (2002), Library Association Publishing, London.
- Anglo-American cataloguing rules 2nd revised ed.(2002).Library Association publishing, London.
- Adama Science and Technology University website statistical report (2018). Retrieved from: <http://www.astu.edu.et/> Access date 09 Sept, 2019.
- Addis Ababa Science and Technology University website statistical report (2018). Retrieved from: www.aastu.edu.et/ Access date 09 Sept, 2019.
- AWA, Wanigasooriya (2008). A Study of Problems Faced By the Online Public Access Catalogue (OPAC), Users in Sri Lankan University Libraries.
- Bates, Marcia J. (2003). Task force recommendation 2.3 Research and design review: improving user access to Library catalog and portal information. Final report (version 3).
- Becker, Danielle A. & Yannotta, Lauren (2013). Modeling a Library Website Redesign Process: Developing a User-Centered Website through Usability Testing.
- Borgman, C. L. (2003). The invisible library: Paradox of the global information infrastructure *Library Trends*, 51(4), 652–674.
- Brophy, P. (2002). The evaluation of public library
- Craven, Jenny, Johnson, Frances and Butters, Geoff(2013). The usability and functionality of an online catalogue.
- Craven, Jenny, Johnson, Frances and Butters, Geoff(2010). The usability and functionality of an online catalogue.
- Central Bank of Sri Lanka (2006), Central Bank Report , Central Bank of Sri Lanka, Colombo.
- Creswell, J. W. (2009). Mapping the field of mixed methods research. *Journal of Mixed Methods Research*,3(2), 95-108.

- Department of Senses and Statistics. (2007). Retrieved from: <http://www.statistic.gov.lk>.
Access date 14 Sept. 2019.
- Fagan, Jody C. (2010). Usability Studies of Faceted Browsing: A Literature Review.
- Fati1, Olufunmilayo Iyabo and Adetimirin, Airen. (2015). OPAC awareness as a factor affecting OPAC use by Undergraduates in two Nigerian libraries.
- Foster, Nancy Fried and Randall, Ryan (2007). Designing the academic library catalog: A Review of relevant literature and projects. University of Rochester, River Campus Libraries.
- Gallaway, Teri Oaks and Hines, Mary Finnan (2012). Competitive usability and the catalogue A Process for justification and selection of a next-generation catalogue or Web-Scale discovery system. Next- Generation Discovery and Access in Library Catalogues,” pp. 173–185 Vol. (61), No. (1).
- ILS, K. (2018). Koha ILS Reviews and Pricing - 2018. [Online] Capterra.com. Available at: <https://www.capterra.com/p/44328/Koha-ILS/> [Accessed 18 Aug. 2019].
- Jia, Mi and Cathy, Weng (2008). Revitalizing the Library OPAC: Interface, Searching, and display challenges.
- Jimma University, (2012). Guidelines and procedures for research. Retrieved from: (www.ju.edu.et) [Accessed 18 Aug. 2019].
- Jimma University Library System Website, (2020). Retrived from: <https://www.ju.edu.et/library/>. [Accessed 18 Aug. 2019].
- Johnson, Frances C. & Craven, Jenny. (2010). Beyond Usability: The Study of functionality of the 2.0 Online Catalogue (OPAC), *New Review of Academic Librarianship*, 16:2,228-250, DOI: 10.1080/13614533.2010.511845
- Judith, Odanwu Ogbole1& Atinmo, Morayo (2017). Factors Affecting Online Public Access Catalogue Provision And Sustainable Use By Undergraduates In two Selected University Libraries In Ogun And Oyo States, Nigeria. Retrieved from : www.iosrjournals.org/ [Accessed 5 Oct. 2019]
- Kani-Zabihi, E.et al. (2008), *International Journal of Information Management*.28, 492–502
- Kani-Zabihi, E., Ghine,G. &Chen, S.Y. (2008). User perceptions of online public library catalog
- Kan, M. & Poo, Danny C. (2005). Detecting and supporting known item queries in online public access catalogs. In *Proceedings of the 5th ACM/IEEE-CS joint conference on digital libraries* (pp. 91– 99). New York: ACM Press (June 7–11).

- Kinsella, Janet, Bryant, Philip.(1987). Online Public Access Catalog Research in the United Kingdom: An Overview is Research Officer, Centre for Catalogue Research, The Library, University of Bath, England; and Philip Bryant is Director, Centre for Catalogue Research,
- Klein, L. R. (2003), 'The expert user is dead', *Library Journal Net Connect* **17**(128), page 36
- Nielsen, J. (1993), *Usability engineering*, Academic Press, Boston.
- Kochtanek, Thomas R. (2017). *Library Information Systems : From Library Automation To Distributed Information Access Solutions*, 2nd Edition, Libraries Unlimited
- Kothari, C. R. (2004), *Research Methodology: Methods and Techniques*, (Second Edition), New Age International Publishers.
- Mahmood, Khalid (2008). *Library web OPACs in Pakistan: an overview*.
- Mansor and Widyawati (2007), "Heuristic evaluation of interface usability for a web-based OPAC". *Library Hi Tech*, Vol. 25 No 4. pp: 538-549. Emerald Group Publishing Limited
- Nagarkar, Shubhadan(2008).Usability testing: study of three WEB OPAC's from three different countries.
- Nielsen, 2012). Nielsen, J. & Sano, D. (1994), Design of sun web - sun mi- cross-systems' intranet, in 'Jacob Nielsen's Alert box', www.useit.com/papers/sun/cardsort.html.
- Neiva, Richard (2017). Screenshot by Ian Shirr / CNET Facebook likes chat windows so much, it's trying them out on your friends' posts too. The social network is testing out a feature on its desktop site that pushes.
- Priyanwada, A.W. A. & Wanigasooriya, Lakmali (2008). A Study of Problems Faced By the online Public Access Catalogue (OPAC), Users in Sri Lankan University Libraries.
- Ruzagea,Mboni (2012)."The Usability of OPAC Interface Features: The Perspective of graduate Students at International Islamic University Malaysia (IIUM)" *Library Philosophy and Practice* (e-journal). 69. Retrieved from (<http://digitalcommons.unl.edu/libphilprac/691>).
- Sangam, L.S. 2006. Use of the Online Public Access Cataloguing IASLIC bulletin, 49(3), 162- 170.
- Sarandakos, Sotirios (2013). *Social Research* (4th Edition).
- Sirohi, Savitra & Gupta, Amit (2010). *Koha 3 Library Management System*.

- Sridhar, M.S. (1986). OPAC vs. Card Catalogue: a comparative study of user behavior.
- Sumner, T. & Dawe, M. (2001). Looking at digital library usability from a reuse perspective, in 'JCDL '01: Proceedings of the 1st ACM/IEEE-CS joint conference on Digital libraries', ACM Press, New York, NY, USA, pp. 416–425.
- Syed, Christopher (2011). Parents of invention: the development of library automation systems (Sumner, 2001) in the late 20th century / Christopher Brown-Syed; foreword by W. David Penniman.
- Umarani, A., Nagarkar, S., and Jagtap, V. (2008). Usability testing: study of three WEB OPACS from three different countries. Department of Library and Information Science, University of Pune
- White, Hayley, Wright, Tim & Chawner, Brenda (2006). Usability Evaluation of Library Online Catalogues. School of Mathematics, Statistics and Computer Science, School of Information Management Victoria University of Wellington.
- Xie, I. & Joo, S. (2012). Information Processing and Management 48. 254–27

Appendices

Jimma University

College of Natural Sciences

Department of Information Science

Questionnaire for Library users (Postgraduate students)

Appendices A:

Dear respondent,

This questionnaire is designed to a reaserch entitled “Usability Study on Library Online Public Access Catalogue Systems: The Case of Selected Ethiopian University Libraries”. To achieve the intended objective of this study, your careful and honest responses determine the success of the study and the researchers as well. Thus you are kindly requested to complete the questionnaire carefully and honesty. Your responses will be kept confidential. Please read the instruction and kindly give your response suitably.

If you want to change any of your responses, make sure that you have cancelled the unwanted ones.

Note:- No need of writing name

Section one: Socio-demographic information

Direction: For each of the following questions, please indicate your response by a tick (√) mark,

or write your possible answers on the appropriate place /box/ (Question1-5).

1. Name of your University _____

2. What is your current educational status?

BSc. MSc.

3. Sex Male Female

4. Name of your department _____

5. What is your responsibility in your parent institution? Specify _____.

Section two: General information about OPAC system and users awareness

2.1 OPAC system and its users

Direction: Please indicate your agreement by ticking one of the responses on the provided space or

boxes (√) mark or write the appropriate answers.(From Questions 1-8).

1. Do you use library OPAC system for your information search purpose?

Yes No

2. If your answer is Yes for Q.1 please estimate the frequency during working hours, you Utilize library OPAC system?

Several times a day Once or twice a day 2 – 3 times a week
Once a week Rarely used Never used

3. What is your level awareness to library OPAC service?

Very high High Medium Low No idea

4. To what extent OPAC saves your time, energy and money?

Very high High Medium Low No idea

5. For what purpose do you use the OPAC system?

To get bibliographic information To know newly arrived information sources

To know the location of requested documents For all information need

If others, Specify _____.

6. What searching strategy do you use to full-fill your information need in using OPAC system?

Simple /basic/ search Advanced Search By default

Others, please specify _____.

7. How do you rate the addition of new materials time to time in the library collection?

Excellent Very Good Moderate Low No idea

2.2. Level of OPAC system awareness by Users

Direction: Please indicate your agreement by ticking one of the responses on the provided space

or boxes (√) mark (or) write the appropriate answers.(From Questions 1-10)

Items Choice: 5= Very high, 4= High, 3= Medium, 2= Low, 1= Very Low

S/N	Key	Level of awareness				
		5	4	3	2	1
1	The Libraries Provide proper user education program for high up the OPAC usage (User education)					
2	Can be searched to know the status of library materials.					
3	Can be identify the location of the information materials.					
4	OPAC features helps to browse contents, databases of the system					
5	Provides ease of access to library holdings					
6	Saves users'' search time spent by users to visit the library					
7	Implemented different searching strategies for the smooth navigation of OPAC system.					
8	OPAC system is convenient to get course based and other information materials					

If you have other additional suggestion /idea/ about the level of OPAC systems awareness by Users. Write here on the space provided

Section Three: Users satisfaction in information need in OPAC’s contents and service use

Direction: Please indicate your agreement by ticking one of the responses on the provided space

or boxes (✓) mark or write the appropriate answers.(From Questions 1-10).

Items Choice: (1) Strongly Satisfied (SS), (2) Satisfied (S), (3) Less satisfied (LS),
(4) Not Satisfied (NS) & (5) Strongly Not Satisfied (SNS)

S/N	Variables	Satisfaction level				
		SS	S	UD	DS	SDS
1	Availability of information in OPAC database somewhat satisfactory					
2	Searching bibliographic records (Author, Titles, Subject, call no. & etc.) is accurate in OPAC system					
4	Accessibility of information resources are retrieved as required to satisfy the need of users					
5	Keyword or subject search strategy is more or less effective in OPAC system.					
6	Real time circulation availability					
7	Navigation of OPAC system with search box and functioning back and forth buttons are properly functional					
9	OPAC service is support/meet the users information need and their behavior as required					
10	Simple and Advanced search functions are work as required					

If you have others additional suggestions /ideas/ about the OPAC systems write here on the space provided.

Section Four: Difficulties/barriers faced by respondents on using the OPAC system features

Direction: Please indicate your agreement by ticking one of the responses on the provided space or boxes (✓) mark or write the appropriate answers.(From question 1-10).

S/N	Parameters	Items Code				
		SDA	DA	N	A	SA
1	KOHA Software interface too difficult to operate					
2	Users Interface design of OPAC (Valid visibility)					
3	Users Understanding level for OPAC System					
4	OPAC system Navigation feedback speed is slow.					
5	On KOHA bibliographic database error					
6	System, services & functionality					
7	Power failure					
8	Internet availability					
9	Series technical problems encountered					
10	On OPAC search engine					

Items Choice Code: 1.Strongly disagree (SDA), 2. Disagree (DA), 3. Nuteral (N), 4. Agree (A) & 5. Strongly Agree (SA).

If you have others additional suggestions /ideas/ about the difficulties of OPAC systems. write here on the space provided

Section Five: Usability of the Library OPAC system features on using the OPAC system

Direction: Please indicate your agreement by ticking one of the responses on the provided space or boxes (√) mark or write the appropriate answers.(From question 1-10).

Items Choice: Code 5 = very easy 4 = easy 3 = moderate 2 = difficult 1 = most difficult

S/N	Parameters	Codes				
		5	4	3	2	1
1	<p>Learnability (Services/facilities)</p> <p>a) Interface with the circulation system</p> <p>b) Provision for the options such as: Document check out</p> <p>c) External links</p>					
2	<p>Navigation :</p> <p>a. Ease of use (navigation)</p> <p>b. improve navigation speed</p> <p>c. provide user guidelines/tutorials</p>					
3	<p>Efficiency:</p> <p>a. The system interface usability is efficient</p> <p>b. The searching tasks accurately perform without error</p> <p>c. The information accessibility efficient as required</p>					
4	<p>Content-/Information Enriched:</p> <ul style="list-style-type: none"> - Library information, Library OPAC - Access points search such as author/title, author /keyword, No authority control for author or title - Access points search bibliographic description of all Library info-materials in the OPAC database 					
8	<p>OPAC Interface Design :-</p> <ul style="list-style-type: none"> - Interface different feature to comparing from google design - Difficult OPAC interface for searching task -Screen Design is suitable for accessing information 					

9	<p>Satisfaction:</p> <ul style="list-style-type: none"> -The system satisfied the information need of the users from database sources. -The OPAC system serve the users by giving accurate and relevant information as required 					
---	--	--	--	--	--	--

If you have other additional suggestion /idea/ about the Usability of OPAC systems write here on the space provided

Thank You

Appendices 'B'

Interviews Questions

For Librarian Professional Staff

Appendices B': Dear the selected respondent persons (for 3-5)

University's Name: _____

Respondent's Position: _____

1. How long have you been in your University library in this position?
2. When did your University library start OPAC Services?
3. What type of Software your libraries used for OPAC?
4. How do you provide OPAC system to access the users easily?
4. How do you see/measure the service of OPAC system to the users?
5. Is there a mechanics that you know the efficient and effectiveness of OPAC services and satisfaction of users?
6. Is there a problem concerning materials resources and human resources?
7. What are the impacts of Internet in accessing OPAC?
8. What is the stage of development your University libraries reached in access OPAC service to
the users?
9. What type of difficulties/challenges that affect the usability of OPAC's Systems?
10. What are your future plan to improve (upgrade) the existing system to give quality services?
11. If you have any (additional) comments and suggestion mention here please?

“Thank You”

Appendices ‘C’

For Researcher Only

Section One: Observation Check List of OPAC’s Availability & Efficiency

Evaluation table (Make it thick with this “√” mark on the space provided)

No.	Item	ASTU						AASTU						
		Availability			Efficiency			Availability			Efficiency			
		Enough	Not	Never	Enough	Not	Never	Enough	Not	Never	Enough	Not	Never	
1	OPAC availability in the assessment schedule in all branch libraries													
2	OPAC display the availability of information materials on assigned library													
3	OPAC effectively access the information of the library resources													
4	Contents of OPAC give adequate bibliographic information to the users													
5	In OPAC user interface searching strategy functional (simple, or advanced)													
6	The library Patron’s has the possibility to navigate the system to get quickly & accurate information as required													
7	Users information need behavior highly decrease on using OPAC due to other means of communication													