JIMMA UNIVERSITY

COLLEGE OF NATURAL SCIENCES

DEPARTMENT OF INFORMATION SCIENCE

USABILITY STUDY OF HIGHER EDUCATION INSTITUTIONAL REPOSITORY FOR ENHANCING INSTITUTIONAL REPOSITORY SERVICE: CASE STUDY OF SELECTED ETHIOPIAN PUBLIC UNIVERSITY INSTITUTIONAL REPOSITORIES

BY: SELEMAWIT WELESLASSIE

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A RESEARCH PROPOSAL SUBMITTED TO COLLEGE OF NATURAL SCIENCES OF JIMMA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR DEGREE OF MASTERS OF SCIENCE IN INFORMATION SCIENCE (ELECTRONIC AND DIGITAL RESOURCE MANAGEMENT)

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DEDICATION

This work is dedicated to my beloved husband G/haweria Weldekidan

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LIST OF ABBREVIATIONS AND ACRONYMS

AAU   Addis Ababa University
ETDs   Electronic Thesis and Dissertations

FRBR   Functional Requirements of Bibliographic Records

HLI   Higher Learning Institution
ICT   Information and Communication Technology

IR   Institutional Repository
ISO   International Standard Organization
JU   Jimma University
OAI   Open Archive Initiative
OAI-PMH   Open Archive Initiative-Protocol for Metadata Harvesting

OARs   Open Access Repositories

OSSOpen Source Software

SPSS   Statistical Package for Social Sciences
WWW   World Wide Web

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ABSTRACT

Institutional repository is a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members. Usability of institutional repository is evaluating in which the system is functionally correct, efficient to use, easy to learn and remember, error tolerant, and subjectively pleasing. The number of Institutional Repositories (IRs) has been growing in the past few years. However, most IRs was not widely used by the intended end users. To increase users' acceptability, evaluating usability of IRs was essential. So, this study was aimed at usability study of higher education institutional repository for improving the institutional repository usability and service. The study was also made operational using cross-sectional survey design with both qualitative and quantitative method. Data was collected using questionnaire and interview from Addis Ababa and Jimma University IR users of 60 postgraduate students and librarians and interview with 4 IR managers who were responsible in the management and maintenance of the IR. The universities and respondents were selected purposefully. The collected data was analyzed using Statistical Package for Social Science version 21 using both descriptive and inferential statistics.The results foundthat no enough thesis uploaded considering all departments, the uploaded thesis were also lacks updating and missing of placements. Postgraduate students' indicated that institutional repository lacks some advanced search like browse by department, publisher, adviser and publication year. Moreover, from the librarians' point of view also revealed that the system has complexity user interface. Slow connection, lack of feedback and multiple language support were also identified from students, librarians and IR administrators. Furthermore, the interview was found that the system lacks additional feature user statistics and plagiarism checker. They also describechallenge that affect usability of IR were lack of awareness about IR and lack of information literacy skill. Furthermore, the result obtained from the interview of Addis Ababa University respondents indicated that the Dspace of IR lack integration with Greenstone and Koha softwares. In Jimma University also the IR lacks accessibility via countryside.The finding recommends that library managers and IR administrators should improve the usability of institutional repository in terms of IR collections (upload ETDs on time and organized them in a right way),make to apply the multiple language and feedback support for improving access, should invest time, staff and resources in marketing the repository to users.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Libraries are powerhouse of information and knowledge. This gives academic libraries the capacity to influence learning, research and teaching in institutions (Batune, 2009). Academic libraries acquire, preserve, organize, distribute and manage information resources in relation to research, teaching, learning and community services to students. Libraries administer and provide quality information services to students, staff, researchers, and the general academic community so as to enhance higher customer satisfaction and better return on investment which in turn foster development nationally and institutionally (Makori, 2015).

According to Dhanavandan& Mary (2015), an institutional repository is a set of services that a university offers to members of its community for the management and dissemination of digital materials created by the institution and its community members. This includes materials such as monographs, academic journal articles, both preprints and post prints undergoing peer review, as well as electronic thesis and dissertations (ETDs).

Institutional repositories provides the means to store, search for and access all types of research output, these knowledge hubs have an important roles to play for creators and users of such materials, multimedia and teaching materials may be added and managers have to ensure that metadata for all item types of high quality and international standards for ease of search and access unless and otherwise the service provided cannot be effective, efficient, easy to use and also it results dissatisfaction of users (Rumsey, 2006).

As Masrek and Hakimjavadi (2012) discussed, there are a lot of softwares that are used in institutional repositories like Dspace, fedora and E-print but, in most of the countries, the institutional repositories are used Dspace software. Because, it is more comprehensive and ready-to-be-used solution for ETDrepositories.Moreover, Kumar (2007) stated thatDspace is a groundbreaking DIR that captures, stores, indexes, preserves, and redistributes the intellectual output of a university's research faculty in digital formats. It manages and distributes digital items, made up of digital files and allows for the creation, indexing, and searching of associated

metadata to locate and retrieve the items. Additionally, it isopen source software that institutions and organizations could run with relatively few resources, support the long-term preservation of the digital material stored in the repositoryand make submission easy.

Institutional repositories built based on digital repository systems like DSpace, EPrints and Fedora for academic research libraries to manage and disseminate digital research materials and data (ARL Digital Repository Issues Task Force, 2009).

International Standards Organization 9241-11(2010) defined usability as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use.In this case, usability of institutional repository indicates that to what extent the institutional repository system gives a good service to users and easy to use. Usability can be measure how easy the interface is to use (Nielsen, 2003).

As ALjohaniandBlustein (2015) mentioned, the user interface of institutional repositories has an effect onusers'performance and satisfaction. So, there is a need to study usability evaluation of institutional repository interface. Moreover, to improve institutional repository system and to overcome the challenges of IR usability evaluating efficiency, effectiveness, helpfulness, adaptability, navigation, language, content, architectural and visual clarity and functionality of institutional repository is very necessary (Oulanov and Pajarilo, 2002).

According to Zhang, et al., (2013) there has also been growing demand of developing IRs to promote discovery of new studies and expand the availability of research materials among researchers of similar interests. Although the necessity and advantages of institutional repositories for scholarly communication have been widely accepted and issues of system implementation have been frequently discussed in the scientific community, there has been a lack of studies concentrating on the usability of institutional repositories in terms of interface, navigation, content, ease of use and support.So, this study was aimed to evaluating the usability of IRs in selected EHLIs institutional repositories for enhancing institutional repository service.

1.2 Statement of the problem

As Calvi (2008) discussed, most of the higher educational institutions build their own institutional repositories using DSpace. This type of Open Access Repository's popularity continues to expand, signals the importance of achieving means of evaluating such services and, recognizes the limitations without the involvement of actual users. However some users are confusing with the interface because there is a lack of logical order of pages since "the interface does not give any sort of feedback to users". For example, in some fields the interface does not indicate which fields are mandatory to fill out or which ones are optional.

According to Hasan (2014), in higher education there is institutional repository usability problems such as, ineffective search function, lacks of navigation support, long time to complete the task, language problems, interface design problem, lacks of information updating, incomplete information and inappropriate design menus. Moreover, Kim and Kim (2008) stated that the page layout on the main page not visible enough because the menu bars are too small and the color is too dark. So, this indicates that the usability of institutional repository is not well.

As Zhang, et al. (2013) discussed that the participants encountered difficulties and confusion during the article submission tasks, as the performance data and their observation showed it took with an average over 10 minutes. The interface design is not communicated well to participants and unable to relate their knowledge to the interface and also the system takes long time for external users to understand how the interface worked or where to start as well as it does not provide enough guidance and help for users to learn the system through interaction. Moreover, Caccialupi, *et al.,* (2009), stated that there are confusions caused by terminology, usability issues of content submission and workflow in usability evaluation of a repository interface. Another problems of institutional repository interface are unclear essential fields for metadata and fragmented and redundant workflow. Therefore, investigating usability of interface is necessary to improve usability of institutional repository.

Fang and Holsapple (2010) describes the navigation structure is used to determine and convey how users access the pages, or information, of a site, i.e. what possible sequences, or paths, users are presented with in order to reach various content. Users want to navigate easily and retrieve the information they need to help them achieve their goals (Ping et al., 2004). But, in terms of

different websites the navigation structure has major problems that users encounter while performing tasks online. So, studying the usability of navigational structure in institutional repository is necessary to ensure the acceptability of the system.

As Shiweda (2011) clarified, the acceptance of IR by potential users has been limited for various reasons including usability constraints forced by system interfaces and the quantity of deposited content remains quite small. In addition to this there are many intellectual outputs deposited in the institutional repositories which organized based on related fields. But, some of the contents has inaccurate placement i.e. physics materials are located in biology department. In addition to this there is lacks updating of contents. Thus, this needs evaluation of institutional repositories contents.

Blandford (2006) note that several authors have revealed that usability evaluation for academic digital libraries and institutional repositories has not given much attention. The usability of Institutional Repository has not been tested which acts as the most significant reason (ALjohani& Blustein, 2015). According to Zuccala (2005) institutional repositories require continuous evaluation to determine their quality and new directions for future growth.

So, there was a need to evaluate the usability of institutional repository in Ethiopian Higher Learning institutions in the light of improving usability of institutional repositories for IR interface, ease of use and support, content and navigation. The reason to focus only for those usability measurements was initially, they are most common parts in institutional repository but finally in the case of time limitation.

1.3 Research Questions

This research was aimed to answer the following research questions.

- ✓ What is the usability of interface design in higher education institutional repository?
- ✓ What is the usability of navigational structure higher education IR?
- ✓ What is the status of higher education institutional repository with regard to ease of use and support?
- ✓ What is the usabilityof content in higher education institutional repository?
- ✓ What are the challenges that affect effective usage of institutional repository?

1.4 Objectives of the study

1.4.1 General Objective of the study

The general objective of this study was to evaluate usability of institutional repository for improving the usability of institutional repository and enhancing institutional repository service.

1.4.2 Specific Objectives of the study

The specific objectives of the study were as follow:

- ✓ To determine the usability of interface design of higher education institutional repository
- ✓ To identify the usability of navigational structure higher education institutional repository
- ✓ To find out the status of higher education institutional repository with regard to ease of use and support
- ✓ To determine the usability of content in higher education institutional repository
- ✓ To identify the challenges that affect effective usage of institutional repository
- ✓ To design a framework of higher education institutional repository usability based on finding

1.5 Scope of the Study

The scope of the study wasto evaluate the usability of higher education institutional repository in selected Ethiopian public universities. As the Ethiopian University websites (2018) showed Addis Ababa, Jimma, Mekelle, Adama, Adigrat, Haramaya and Debre Berhan Universities wereusing Dspace softwarefor their institutional repository but, most of them were not functional exceptAAU, HU and JU. Therefore, the study was limited on JU & AAUbecause they are convenient to the researcher.

1.6 Limitation of the study

The limitation of the study was lack of heuristic evaluation (the experts means those who are specialized in usability and human computer interaction).Another limitation of the study was alsothis study were not measured other more criterias in addition to content, ease of use and support, navigation, interface design. The major limitation of the study was also coverage. Since

there was lack of awareness and information literacy skill in most of users this study doesn't cover extra departments and librarians.Lastly to carry out an in-depth study time was taken as a limitation to the study.

1.7Significance of the study

This study is significant for the library administrators/managers and system designers to take into account the important points and find solutions to the problems occurred. This also helps to the instructors and student of the university through improving the usage of institutional repository.Finally, the researchers can be benefited from this researchbecause this study fills the gap of literature.

1.8 Operational Definitions

Institutional Repository (IR): is a set of services offered by a university or group of universities to members of its community for the management and dissemination of scholarly materials in digital format created by the institution and its community members, such as e-prints, technical reports, thesis and dissertations, data sets, and teaching materials.

Digital institutional repository: is the digital archive of the intellectual product created by the faculty, research, staff, and students of an institution and accessible to end users both within and outside the institution with few if any barrier to access.

Library website: a website that serves as a key gateway to library services.

Usability: is the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.

Usability of institutional repository: is an approach to assess if institutional repositories are easy to use for end-users without requiring important quantity of training, guiding or learning.

Open Access: is defined as free use of research output available on the public internet, permittingany user to read, download, copy, distribute, print, search or link to the full texts of these articles,or use them for any other lawful purpose,without financial, legal, or technical barriers other than those inseparable from gaining access tothe internet itself.

Higher learning institution: - The HLI can be defined as a university level education which offers a number of qualifications ranging from Higher National Diplomas and Foundation Degrees to Honors Degrees and as a further step, Postgraduate programs such as MSc and PhD.

CHAPTER TWO

LITERATURE REVIEW

2.1 Definition of institutional repository

Donovan and Watson (2008) describe the IR as a means of collecting the intellectual digital outputs of an organization. According to Rosenblum (2008) an IR is a resource or system that facilitates the capture, storage, preservation and dissemination of the intellectual output of an institute in electronic form. Such output varies from institution to institution; some will capture thesis and dissertations, whilst others will capture published papers, unpublished pre-prints, working papers, conference presentations, data sets, teaching materials and other similar material. Whatever output is captured into an IR will be described using standard metadata formats and protocols, the tags that describe the output and enable recognition and retrieval of the output on the World Wide Web.

According to Nwakaego (2017), an institutional repository (IR) is a set of services offered by a university or group of universities to members of its community for the management and dissemination of scholarly materials in digital format created by the institution and its community members, such as e-prints, technical reports, thesis and dissertations, data sets, and teaching materials. Stewardship of such materials entails their organization in a cumulative, openly accessible database and a commitment to long-term preservation when appropriate.

In another way an institutional repository (IR) is an online archive for collecting, preserving, and disseminating digital copies of the intellectual output of an institution, particularly a research institution. (Dhanavandan& Mary, 2015).According to ARL (2009) an institutional repository software platforms uses a common open standard which is called OAI-PMH (Open Archive Initiatives for Metadata Harvesting).

2.2 Evolution of Institutional Repository

Repositories have occurred ever since humans began collecting and storing important information and artifacts for safekeeping and long-term use. The long and rich history of libraries, museums, and archives provides the foundation for any type of repository program, but

two contemporary developments in particular have helped shape the nature of today's IRs. Institutional Repositories first appeared in 2002 as an institutional response to the increasing trend for scholars to post their research online, usually on their homepages but also in subject based repositories. Repositories are associated with a number of different scholarly initiatives and there is a large body of literature that describes open access repositories (OARs) and explores their role within scholarly communication and publishing. The development of OARs resulted in part from a need to address problems inherent in the present system of scholarly publishing (Johnson, 2002). Jones, Andrew & MacColl (2006) identified the elements that are directed to the development of IRs. These are e-thesis archives, departmental e-print archives, faculty practice of e-prints on personal web pages, subject repositories, need from institutions for preservation/presentation of research output, open access aims and distributed document servers.

The history of institutional repositories (IRs) is relatively short, with the first discipline based repositories being implemented in the early '90s. Scientific journal was begun in 1665 to enable researchers sharing their work quickly and widely and to establish the priority of researchers investigating the same problem. Before OARs, the emerging technologies like File Transfer Protocol (FTP), Gopher, and the World Wide Web (WWW) were used to increase availability of scholarly material by lowering the barriers to distribution. According to Jones, Andrew & MacColl (2006) the creation of the Open Archives Initiative in 1999 as being a major factor in the rise of institution based repositories. In addition, several Open Source Software (OSS) communities have formed to create successful digital repository software that is available for free. And now several digital repository software products are available on open source domain.

2.3 Benefits of IR and Higher Learning Institution

According to Moahi (2009), in higher learning institution institutional repositoryenhance citations, increase availability of research information, and advancement of scholarly research through quick and easy access. Institutional repositories are popular among universities worldwide (Bailey, 2008). According to Lynch (2003), fundamental to the basics of IRs "remains recognition that the intellectual life and scholarship of our universities will increasingly be represented, documented, and shared in digital form." At the same time, the IR as a channel allowing the university structuring its contribution to the global community, there exists the responsibility for reassessment of both culture and policy and their relationship to one another.

IRs have their potential benefits in improving the scholarly communication, providing open access service (unless there are some legal restrictions), and allowing content management (Heery and Anderson, 2005). Further, Institutional repositories act as an opportunity to increase efficiency through any organization's various departments by eliminating practices that include exchanging scholarly documents as hard copies instead of digitally (Gibbons, 2004). Moreover, "in a university setting, an IR provides a centralized digital showcase through which community members can highlight their work" (Gibbons, 2004). Yeates (2003) also listed the benefits of IR such as: extending the range of knowledge sharing, existing investment in information and content management systems can be leveraged; and more flexible ways of scholarly communication are available. Thus, these benefits might not obtain the users if there are usability problems in the IR interface, navigation, ease of use and support and contents.

2.4 Institutional Repository Softwares

As Masrek and Hakimjavadi (2012) discussed, there are a lot of softwares that are used in institutional repositories like Dspace, Fedora and E-print but, in most of the countries, the institutional repositories are used Dspace software. Because, it is more comprehensive and ready-to-be-used solution for ETDrepositories. Moreover, Kumar (2007) stated that Dspace is a groundbreaking DIR that captures, stores, indexes, preserves, and redistributes the intellectual output of a university's research faculty in digital formats. It manages and distributes digital items, made up of digital files and allows for the creation, indexing, and searching of associated metadata to locate and retrieve the items. Additionally, it is open source software that institutions and organizations could run with relatively few resources, support the long-term preservation of the digital material stored in the repository and make submission easy.

Institutional repositories built based on digital repository systems like DSpace, EPrints and Fedora for academic research libraries to manage and disseminate digital research materials and data (ARL Digital Repository Issues Task Force, 2009). DSpace allows saving, sharing and searching digitized research images, conference papers, preprints, peer-reviewed scholastic articles, technical reports, working papers (DSpace, 2013). This study will also focus on usability study of institutional repository which is used DSpace software.

2.5Definition of Usability

Usability is defined in varied terms by numerous researchers. Shackel (2009) describes usability as "technology's capability to be used easily and effectively by the specified variety of users, given particular guidance and user support, to fulfill the specified range of tasks, within the specified range of environmental scenarios".

The Usability Professionals' Association (2005) defines usability as follow: Usability is the degree to which something software, hardware or any other website is easy to use and a good fit for the people who use it.

Usability is defined as "the study on a product or system to make it easier to use" (TiryakiErsen, 2004). According to International Organization for Standardization (ISO 9241-11, 1998); usability is "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use".

Nielsen (1993) points out that usability has five attributes: (a) learnability: The system should be easy to learn, (b) efficiency: The system should be efficient to use, (c) memorability: The system should be easy to remember so that the casual user is able to return to the system after some period of not having used it, without having to learn everything all over again, (d) errors: The system should have a low error rate, so that users make few errors during their use of the system and can easily recover from any error they may make, and (e)satisfaction: The system should be pleasant to use. Brinck, Gergle, and Wood (2002) share a similar perspective that usability is: (a) functionally correct: The system correctly performs the functions that the user needs; (b) efficient to use; (c) easy to learn; (d) easy to remember; (e) error tolerant: Errors are easily prevented, detected, identified, and corrected; and (f) subjectively pleasing. In addition, Booth (1989) outlines four factors of usability: usefulness, effectiveness (ease of use), learnability, and attitude (likeability).

Quesenbery (2001) declares that usability has five E's: effective, efficient, engaging (i.e., pleasant and satisfying to use), error tolerant, and easy to learn. Hix and Hartson (1993) classify usability into initial performance, long-term performance, learnability, retainability, advanced feature usage, first impression, and long-term user satisfaction. Karoulis and Pombortsis (2003) suspect that usability (effectiveness, efficiency, and satisfaction) and learnability of educational

environment are positively correlated and wonder how far one affects the other, although they did not actually carry out a study to examine this possible correlation.

Guenther (2003) defines usability as ease of navigation, ability with minimal clicks to complete tasks, appealing visually yet easy to understand, and providing the appropriate level of interaction in order to facilitate the completion of tasks while keeping users engaged.Saracevic (2005) breaks down usability in terms of content, process, format, and overall assessment.

2.6Usability Evaluation/Testing

Usability evaluation is concerned with collecting information about the usability of a system, in order to evaluate it or to improve its performance by identifying problems and suggesting improvements (Shneiderman&Plaisant, 2005; Ssemugabi& Villiers, 2007).

Thomsett-Scott (2004) stated that usability techniques can be divided into threecategories:

1. Inquiry: means the techniques that involved users' perceptions and opinions.
2. Inspection: means the techniques that looked at the sites from the users' perspectives.
3. Formal usability studies: means the techniques that involved direct observation of users.

Therefore, this study was used inquiry and inspection method of usability evaluation.

2.6.1 How to Conduct Inquiry and inspection usability Evaluation?

Inquiry: referred to the techniques that involved users' perceptions and opinions using different ways (focus group, interview, questionnaire and observation). To perform this, the researcher was conductedquestionnaire and interview to evaluate usability of institutional repository.Questionnaires were done by 5-likert scale type of questions and some open-ended questions.The interview also conducted with open-ended or unstructured questions to gather the detailed information.

Inspection: means in which the evaluators inspecting (checking) the interface. Usability inspection is aimed at finding usability problems,if the design contains necessary elements, whether it is working or not using the major types of inspection methods such as heuristic evaluation, cognitive walkthroughs, formal usability inspections, pluralistic inspections, walkthroughs inspections, feature inspection, consistency inspection and standards inspection. Therefore, this study used standards inspection since the users inspect on some interface standard for compliance (Nielson, 1994).

2.6.2Usability measurements

The following table provides usability measurements as Lee and Kozar's (2012) reviewing a literature with the purpose of identifying various website usability categoriesand questions used to measure the categories. The authors revealed that Lee and Kozar's (2012) usability constructs to be more helpful than Nielsen's (1994), because they describe the construct, or the what, and identify specific functionality to review. If a novice reviewer used the 9 or 11 categories of usability testing as a guide for reviewing a website or any other system, they may not know where to look or how to determine whether error prevention, for example, was used or not. Therefore, this study also wished to use those checklists and modifying some categories to measure the usability of institutional repository. In addition to this, the criteria's of Garett, et al. (2017) was also used.

Table2.1 categories, definitions and measurement questions of usability

Categories	Definition	Usability Measurement Question
Design layout	To what extent the interface is designed comfortable to users	(1)Proper Use of images (2) the page design is appropriate (3) Appropriate choice of colors (4) Appropriate use of fonts and texts (5) the design layout avoids user confusion (6) font and color formatting enhances content readability
Ease of use	The effort that is required to operate a system once it has beenunderstood and mastered by the user.	(1) the system is easy to use (2)it is simple to accomplish the task I want to accomplish (3)It is easy to find the information I need (4)Slow downloading of the site's pages
Organization of information /Architecture	It describes the way of organizing the information in the system	(1)Cognitive mapping/architecture (2)Understandable structure (3)Logical organization (4)Hierarchical/sequencing organization (5)Systematic information arrangement and categorization (6)Meaningful labels/headings/titles (7)keywords (8)Deep architecture (the number of clicks to reach goals is more than 3)

Consistency	Consistent location of page components within and across pages	(1) It repeats the same structure, components, and overall look across pages. (2) The website contains similarcomponents across web pages. (3) Web pages in the website areconsistently designed. (4) Each web page on the website is of similar design. (5) It adheres to rules and standards of other online shopping sites.
Navigability	Capability to provide alternativeinteraction and navigatingtechniques	(1)searching information within a website without browsing through webpages (2)It has an address that uniquely identifies (3) the Links connect Webpages and documents within the website to each other (4) It include sitemap used to find specific information under a certain section of the place (5) Itprovides multiple search features (e.g., search engine, menu bar, go back- and-forward button, etc.) to obtain thetarget information. (6) The web page that I am looking for can be reached through multiple pathways. (7) There are multiple ways to access the web page that I am looking for and/or return to shopping menus. (8) It is very easy to locate what is needed in this site
Supportability	Additional information and supportmechanisms readily available toenhance the website use experience	(1) While visiting the website, I feel that Ican get just-in-time support anytime I needit (2) It provides features to ask forhelp anytime I need (3) Getting support through a series ofoptions is easy and convenient
Learnability	Easy to learn the main functionalityand gain proficiency to complete thetasks	(1) The contents provided are easily understood. (2) it is designed for easyunderstanding (3) I can easily remember how to reach thesame page when I visit next time (4) As time passes, I ammore familiarto the system with less effort.
Simplicity	Provision of minimum contents andfunctions within a website	(1) The structure of the system is brief. (2) I can understand most components of apage within seconds. (3) it has unnecessary components (4) There are redundant components in thewebsite.
Interactivity	Website's ability to create	(1) The system provides an appropriateamount of

	clear interaction and communication with users	interactive features (e.g. graphics, pop-up windows, animation,music, voices). (2) The systemcontains components tohelp the interaction between it andconsumers. (3) Interactive features of the systemareclear and suggest responses. (4) The systemprovides features forinteractive communication betweenuser and the system
Readability	Extent to which website components are well organized and easy to read and understand	(1) The system's wording is clear and easyto understand. (2) The systemhas enough white space (ormargins) to make it readable. (3) Every page contains the appropriateamount of components to fit into a page. (4) The systemuses colors and structuresthat are easy on the eyes.
Content Relevance	Extent to which the content is up-to-dateand pertinent	(1) The system contains full/enoughinformation. (2) The systemprovides up-to-date information. (3) The scope of information provided by thesystemis appropriate. (4) The information provided by the systemis accurate.

2.7 Criteria for evaluating usability of institutional repository

This study was evaluated the usability of interface, content, ease of use and support and navigation of IR as discussed below.

2.7.1 Interface/Design layout

A good IR or any other site should have a simple user interface. Design layout for webpages should be consistent so that people find it enjoyable and comfortable to access the desired information without wasting time. A good color scheme and well-structured design elements make content easy to read.

2.7.2 Navigation

Navigation is a major consideration for web users. Matters that can be helpful to navigation are a logical and standard architecture to the information in a site, sufficient indicators to tell the current location, and the language and the organization of the navigation system that could meet users' expectations and needs for the task (Sawetrattanasatian, 2015).

Fang and Holsapple (2010) describes the navigation structure's main purpose is to determine and convey how users access the pages, or information, of a site, i.e. what possible sequences, or paths, users are presented with in order to reach various content. Consequently, the navigation structure will affect how the content of a website is organized. It describes a semantic approach on how users should reach various content of a website. As Hassine (2017)in the case where the site consist of a single page the navigation can, for example, deal with techniques that enables users to jump up or down to different positions on the page instead of scrolling there. Consequently, this can increase the speed in which users can find information.The basic element of an effective institutional repository system is its navigability. Asiimwe& Lim (2010) claimed that a good navigation structure and navigation tools help users find information easily and quickly on WebPages.

2.6.3 Content

This considers whether a site includes the information users require. Research stresses the importance of this factor and shows that it is one of the most important factors that influence web usability its content consists of seven subcategories (Agarwal&Venkatesh, 2002).These are: up-to-date information, relevant information, terminology/terms are clear and unambiguous, no under-construction pages, accurate information

2.7.4 Ease of use and support

This criteria or factor indicated that the system enable users to easily interact and fast downloading and retrieving. It should also support multiple language support, feedback tool that help faster and efficient communication between the system and users.

2.8 Related Works

Some researchers conducted usability related studies in different parts of the world. However, according to the researchers' knowledge there were no studies conducted on the Usability of Institutional Repositories that aimed evaluating institutional repository system by considering the categories of its navigation, content, ease of use and support and interface design in Ethiopia.

ALJohani (2013) in his study of "Usability evaluation of institutional repository interface" aimed to expose usability problems in institutionalrepository interface which was increase the system

usability and users' acceptance when fixed. The finding of the study shows that when deleting summations, insufficient help documentations, system does not provide error messages,not easy to find collections, search boxes are confuse users because two different search boxes are exist and the system has extra discover option which is unnecessary. The results from the study used to create task scenarios for the Heuristic Evaluation study and also used as a tool given to the development team in order to communicate their needs during the design iteration.However, the study had some limitations like non-involvement of real users and having a convenience sample of students can be a major limitation; the researcher suggested that, "further research should be conducted to have different students from different departments" because all the participants were from computer science faculty and they were very small in number. In addition to this the researcher evaluated usability of user interface only. While, this study were involved with real users of the systemincluding librarian, IR administrators and postgraduate students from the departments computer science, information technology, networking andinformation science by considering 4criterias like interface, content,ease of use and support and navigation.

The study by Koshiyama, et al, (2015) "Analysis of Usability and Information Architecture of the FRN Institutional Repository" targeted to identify the possible problems of usability and information architecture of the institutional repositories. They discuss the usability problems related to searching and submission tasks only. Their finding indicates that as there are many usability problems in performing tasks according to Nielsen's usability problems severity level such as small font, two search fields on the main page are not necessary, there is no information about success or failure when the actions are performed, the system does not indicate the required fields, the introductory texts of the steps are not wording clear. Based on these findings they recommend to perform a revision throughout the layout and labeling/terminology text to make them simple, clear and consistent, remove from the page the unnecessary informations, provide confirmation to the tasks performed by the user, highlight important information and commands to perform the task and highlight form fields that are filling required. The implementation of these recommendations could help to develop a more efficient and satisfactory interface, favoring the system usability in tasks as search and submission. However,the study was focused on evaluating usability of 4 criterias of the institutional repository system.

Calvi (2008) done a research on "Expert Evaluation of an Institutional Repository based on DSpace", In her report provides the results of an expert evaluation of Lessius University's institutional repository based on DSpace. The findings from the study indicate that there is a lack of logical order of pages and the interface does not give any sort of feedback to users. Another finding also, some library terminology was confusing to general users as they do not have the librarian expertise regarding specifying the type of publications. So, users needed some explanation for these symbols. The study was targeted at only librarians and cataloguerswhereas; this study was targeted IR administrators and real users of IR like students from different departments in addition to librarian.

Charles, et al. (2013) discussed on their study of "Usability evaluation of a research repository and collaboration website" with the objective of evaluating the usability of HABRI Central as a research repository and collaboration platform. The finding shows that the separation of resources and bibliography due to adaptation of the HUBzero platform caused some confusion among participants, and certain steps of the resource submission process (e.g., selecting resource type and adding authors) could be improved to provide clear guidance and facilitate user input. This study has limitation on number of participants, which could not lead to statistically significant results. However, the evaluation was part of an iterative design process and its objective was to identify usability issues and provide design suggestions through task performance measures and subjective feedback. The evaluation methodology used in their study was potential users and task Performance measures and integrated to a structured user-centered design process for improving HABRI Central. While this study was useddifferent participants to evaluate the institutional repository in order to get more detailed information about the Ethiopian public university institutional repository system.

CHAPTER THREE

METHODOLOGY

In this section, the research design and methodologies used to conduct the research are presented. The sections below include the description of study area, research design, study population, sample and sampling techniques, Source of data, Data collection method and Data analysis.

3.1 Description of the Study Area

There are 33 public universities established in different parts of Ethiopia that have been authorized by the Ministry of Education. From these universities the current research was focused on to Addis Ababa University (AAU) and Jimma University. AAU is located in Addis Ababa, the capital city of Ethiopia and established in 1950 up until 1991. Jimma University also located in Oromia region, Jimma zone about 346 km from Addis Ababa. Both these universities have libraries supported by modern technologies to share service of electronic materials and to increase ease of access of these services to their users like digital library and institutional repository. Accordingly, the current study was focused on evaluating of the institutional repository system usability.

3.2 Research Design

The study used both qualitative and quantitative approaches. The study was also made operational using cross-sectional survey since the study was carried out at one time point or over a short period (Levin, 2006). Data relevant for quantitative analysis was collected by way of questionnaire and qualitative type of data also collected by interview. The data was collected from respondents of Addis Ababa University and Jimma University IR users (who have regular interaction with the system). These were postgraduate students,librarians (digital/electronic librarians, etc.) who were engaged in the delivery of services using IR and IR administrator who were responsible in the management and maintenance of the IR. The universities were purposefully selected for the research, at present, from the preliminary findings made by the researcher, it was found that their IR was functional and they were providing services using their IR.

3.3 Study Population

The population considered for this research was users of institutional repository from postgraduate students, librarians and IR administrators of Addis Ababa University and Jimma University. Such a focused population set was identified based on the nature of research. Usability by its nature has technicalities that must be understood while the design as well as utilization of the IR. It is the firm belief of the researcher that the respondents of this research must be those users who are familiar in the design aspect of the system that are used to make the IR accessible. Therefore, the study population was identified based on this rationale.

3.1 Study Population for postgraduate students

Jimma University			Addis Ababa University		
Department/school	total population	number of IR users	Department/school	total population	number of IR users
Information science	32	13	Information science	67	8
Computer networking	39	9	Computer science	30	7
Information Technology	33		Information technology	27	5
Total	104	22	Total	124	20

3.2 Study Population for professional library staff

Jimma university		Addis Ababa university		
Library professional staff	IR users	Library professional staff	IR users	
22	10	27	11	

From the above table total population of the study from the specified departments of postgraduate students was 228 and 49 librarian total 277 from both universities. Therefore, for the study purposively selected the users of IR only 42 postgraduate student +21 librarian =63. The 4 respondents of interview also selected because they are the only worker on IR.

3.4 Sample and Sampling technique

Among the available 33 public universities three universities were selected purposively that means as the researcher found that their IR is functional and they are providing services using their IR. Then from those three universities also universities of Addis Ababa and Jimma were selected using convenience method for the current research.

The postgraduate students and librarians were selected purposively since they are users of the system and related to the area of the study. For interview purpose also selected 2 from AAU and 2 from JU who work on IR which were responsible for the development and management of the institutional repository. These were the only expert in customizing and configuring of the IR and are familiar with design aspect of the system. The researcher identified 63 respondents who have good hands in utilizing IR. These respondents were 32 from Jimma and 31 from Addis Ababa Universities. Therefore, the respondents for this study were totally 63 by incorporating 4 librarians who work on IR.

3.5 Method of Data Collection

The data has been collected usingquestionnaire with both open-ended and close-ended questions by selecting respondents from each university. Questionnaire method was used to collect data from the postgraduate student and librarians in their university. The questionnaires included a number of questions: general information, usability of institutional repository and Likert type items. Likert – type items were used to ask the respondents to give their response by choosing "strongly disagree" (scored a"1"), "disagree" (scored a "2"), "neutral" (scored a"3"), agree (scored a"4") and "strongly agree" (scored a"5"). Furthermore, the researcher conducted interview from the responsible persons to get detailed and accurate information about the institutional repository system usability.

3.6 Data Collection Procedure

The data was collected using questionnaire and interview. The questionnaires were developed using suitable questions modified from related research and approved by the advisors. The questions were modified from,Lee and Kozar (2012), Garett et al. (2016) and Kim and Kim (2008).

3.7 Sources of Data

The source of data for this study was primary and secondary data sources. Primary data are those which are collected for the first time. Secondary data are those which have already been collected by someone else and which have already been passed through the statistical process. The primary data sources obtained through questionnaire and interview from IR users and workers of Jimma and Addis Ababa University. The secondary data also obtained from various sources such as books, journals, Internet sources and research reports was employedfor document analysis.

3.8 Validity and Reliability

3.8.1 Validity

To check the validity of this research instrumentsthe researcher carry out a pre-test on selected respondents and corrections are made based on the feedbacks collected from Jimma University (one librarian, one ICT team leader and two postgraduate students). Accordingly, some comments were incorporated then distributed the instrument for the respondents. The content validity also assured when the questionnaire is prepared based on extensive reading of literature review.

3.8.2 Reliability Test

Reliability is the extent to which results are consistent over time. Reliability checks internal consistency of the instrument (Zikmund & Babin, 2010). Cronbach's Alpha coefficient was used to test the reliability of the study questionnaire.

Table 3.1 Shows the reliability results of Cronbach's Alpha test

Factors	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
Navigation	.924	.933	7
Ease of use	.791	.806	6
Interface design	.939	.941	7
Content	.650	.655	7

The above table shows that the reliability statistics which conducted using Cronbach's Alpha coefficients. From the above table, the value of Cronbach alpha for Navigation, Ease of use, Interface design and Content are .924, .791,.939, .650 respectively. According to Zikmund & Babin (2010) the recommended value of the cronbach alpha coefficientsmust be>/=0.6 thenthe measure can be acceptable and fair measure. So, all factors were reliable and important for usability of institutional repository as all are >/=0.6.

3.9 Methods of Data Analysis

After collecting data from the respondents the researcher was analyzed using Statistical Package for Social Science (SPSS) version 21 using both descriptive and inferential statistics which can be used for analyzing data using tables with frequencies, mean ranking, standard deviation, percentage and graphs by descriptive analysis.In addition to thisthe researcher considered inferential statistics to know its significance, confidentiality and therelation between the dependent (usability)and independent variables (ease of use and support, interface, content and navigation).

3.10 Study Variables

The important variables of this study were dependent and independent variables. Dependent variable is a variable that is affected or explained by another variable. An independent variable is also a variable that causes change in other dependent variables (Jabar*et al*., 2013).

3.10.1 Dependent Variable

The dependent variable of this study was institutional repository usability.

3.10.2 Independent Variables

Independent variables were interface design, navigation, content and ease of use and support. These variables are usability factors that can serve as a guideline and can also be used for measuring usability level of universities institutional repository.

3.11 Ethical Consideration

Ethical considerations have been carefully followed during designing of the instruments. This research was not enforced and deceived the participants. All the study population was requested for oral informed consent prior to enrolment to the study. The purpose of the study was clearly described to the study participants including the importance of the study. Any information concerning the study participant was kept confidential and the data collected from the study were only considered for the proposed purposes.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 RESULTS

4.1.1 Response Rate

This chapter deals with the results and discussions of the analysis. The data was gathered from students of different departmentsand expert librarians in two selected universities; Jimma and Addis Ababa Universities. It was obtained through questionnaires. The total numbers of distributed questionnaires were 63 out of which 60 were filled and returned. These number shows that above 95 % were filled and returned. Those total 60 questionnaires were filled properly and found appropriate for analysis because all of the respondents were engaged in consistent interaction of the institutional repository system.

Table 4.1Number of distributed and collected questionnaires

Universities	Number of questionnaires		
	Distributed	Collected	Percentage
AAU	31	29	93.5%
JU	32	31	96.9%
Total	63	60	95.2%

4.1.2 General Information of Respondents

Table 4.2 general information of respondent

Respondents university					
	Frequency	Percent	Valid Percent	Cumulative Percent	Mean
Jimma University	31	51.7	51.7	51.7	1.48
Addis Ababa University	29	48.3	48.3	100.0	
Total	60	100.0	100.0		
Respondents sex					
Male	54	90.0	90.0	90.0	0.10
Female	6	10.0	10.0	100.0	
Total	60	100.0	100.0		

Respondent's position						
	postgraduate student	41	68.3	68.3	68.3	1.34
	Librarian	19	31.7	31.7	100.0	
	Total	60	100.0	100.0		
Respondents educational status						
	BSc	2	3.3	3.3	3.3	1.93
	MSc	57	95.0	95.0	98.3	
	PhD Candidate	1	1.7	1.7	100.0	
	Total	60	100.0	100.0		
Respondents department						
	computer science	9	15.0	15.0	15.0	2.41
	information science	33	55.0	55.0	70.0	
	information technology	5	8.3	8.3	78.3	
	information system	4	6.7	6.7	85.0	
	school of computing	9	15.0	15.0	100.0	
	Total	60	100.0	100.0		

The above table shows that, general information of respondents from 29(48.3%) AAU and 31(51.7%) JU in the mean of 1.48. The resultindicates that the majority of the respondents were 54(90%) males and 6(10%) females in the mean of 0.10. The result revealed that 68.3% postgraduate student and 19(31.7%) librarians in the mean of 1.34. The majority of 95% have MSc degree, 3.3% have BSc and the rest 1.7% were PhD candidate in the mean of 1.93.The majority of 33(55%) respondents were from information science department in the mean of 2.41.

4.1.3 Habit of using the institutional repository
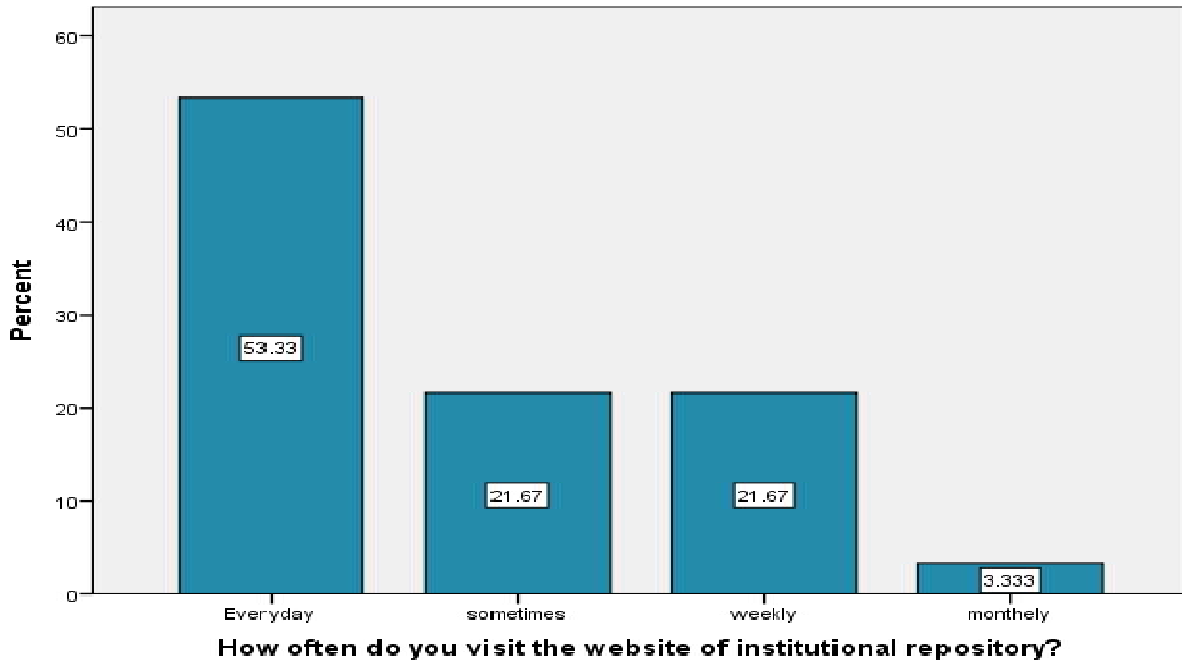
Figure 4.1habit of using the institutional repository

The result of finding shows that, the majority of 53.33% visited the IR every day, the same frequency 21.67% used sometimes and weekly and the least 3.333% used monthly. This indicates that there is good habit in using of the institutional repository.

4.1.4Factors that affect usability of higher education institutional repository

The results were discussed based on the following table of Likert scale interpretation.

Table 4.3 Likert scale interpretation

Likert scale interpretation and distribution of values		
Likert scale	Likert	value allocation
1	strongly disagree	1.0-1.49
2	disagree	1.5-2.49
3	neutral	2.5-3.49
4	agree	3.5-4.49
5	strongly agree	4.5-5.00

Source: Alston and Miller (2002); Moohammad et al. (2014)

Table 4.4usability of navigational structure of institutional repository

Criteria	Items	Respondents response					Central Tendency		
		SDA	DA	N	A	SA	M	SD	DN
Navigation	It is easy to go to the home page from any sub-page of the site	6(10.0%)	6(10.0%)	2(3.3%)	18(30.0%)	28(46.7%)	3.93	1.351	A
	Links are working properly and are not confusing so that the user knows what to expect from the destination page	6(10.0%)	4(6.7%)	8(13.3%)	13(21.7%)	29(48.3%)	3.92	1.344	A
	The site has not broken links	0	4(6.7%)	7(11.7%)	20(33.3%)	29(48.3%)	4.23	.909	A
	The site has not orphan pages	1(1.7%)	2(3.3%)	5(8.3%)	22(36.7%)	30(50.0%)	4.30	.889	A
	The address(URL) represents the name of the institution	1(1.7%)	0	5(8.3%)	16(26.7%)	38(63.3%)	4.50	.792	A
	It is easy to memorize in relation to what the institution does	0	3(5.0%)	6(10.0%)	22(36.7%)	29(48.3%)	4.28	.846	A
	It has important search features like menu bar, go back- and-forward button, etc.) to obtain the target information	0	10(16.7%)	2(3.3%)	12(20.0%)	36(60.0%)	4.23	1.125	A

SDA (1) =strongly disagree, DA (2) = disagree,N (3) = Neutral, A (4) =agreeSA(5)= strongly agree, DN= Decision

In the above table, for the question it is easy to go to the home page from any sub-page of the site also found that agree in the mean of 3.93. Majority of respondents agreed that links are working properly in the mean of 3.92. The majority of respondents were agreed in the mean of

4.23 the site has not broken links. Most of respondents were agreed that the site has not orphan pagesin the mean of 4.30. The address (URL) of institutional repositories represents the name of the institutionas most of respondents agreed in the mean of 4.50.The IR was easy to memorize in relation to what the institution does as the result indicatedmajority ofrespondents agreed in the mean of 4.28. As the result indicated majority of respondents agreed in the mean of 4.23 the IR has important search features like menu bar, go back- and-forward button, etc.) to obtain the target information.

Table 4.5status of institutional repository usability with regard to ease of use and support

		Respondents response					Central Tendency		
Criteria	Items	SDA	DA	N	A	SA	M	SD	DN
Ease of use and support	Interaction with the institutional repository is easy	3(5.0%)	4(6.7%)	10(16.7%)	10(16.7%)	33(55.0%)	4.10	1.203	A
	Finding the required information is easy	6(10.0%)	2(3.3%)	3(5.0%)	20(33.3%)	29(48.3%)	4.07	1.260	A
	It facilitate fast information retrieval	6(10.0%)	6(10.0%)	4(6.7%)	16(26.7%)	28(46.7%)	3.90	1.362	A
	The institutional repository provides fast downloading of collections	5(8.3%)	4(6.7%)	7(11.7%)	16(26.7%)	28(46.7%)	3.97	1.275	A
	The institutional repository provides multiple language support	30(50.0%)	11(18.3%)	9(15.0%)	2(3.3%)	8(13.3%)	2.12	1.415	DA
	It supports feedback tool that help	28(46.7%)	12(20.0%)	9(15.0%)	2(3.3%)	9(15.0%)	2.20	1.447	DA

	faster and efficient communication between the system and users							

SDA (1) =strongly disagree, DA (2) = disagree,N (3) = Neutral, A (4) =agreeSA(5)= strongly agree, DN= Decision

Easy interaction with the institutional repository, finding the required information, it facilitates fast information retrieval and provides fast downloading of collections as respondents agreed in the mean of 4.10, 4.07, 3.90,3.97 respectively.Majority of respondents were disagreed for multiple languagesand feedback tool supportin the mean of 2.12 and2.20 respectively. There for this result showed that most of respondents agreed as the institutional repository is easy to use but with feedback and languages support were disagreed. In this case, the institutional repository of higher education doesn't perform its objective. Because, the major item that help faster and efficient communication between the system and users was not effective.

Table 4.6usability of interface design of institutional repository

		Respondents response					Central Tendency		
Criteria	Items	SDA	DA	N	A	SA	M	SD	DN
Interface Design	The interface is attractive so that it impresses the potential users	2(3.3%)	10(16.7%)	9(15.0%)	12(20.0%)	27(45.0%)	3.87	1.255	A
	The design of the pages is appropriate	0	9(15.0%)	8(13.3%)	14(23.3%)	29(48.3%)	4.05	1.111	A
	The design is not confused for users	2(3.3%)	7(11.7%)	5(8.3%)	17(28.3%)	29(48.3%)	4.07	1.163	A
	The design layout & colors are the same for all webpages	3(5.0%)	10(16.7%)	4(6.7%)	13(21.7%)	30(50.0%)	3.95	1.307	A
	Font size of institutional repository interface is good(increases	5(8.3%)	7(11.7%)	3(5.0%)	13(21.7%)	32(53.3%)	4.00	1.353	A

	content readability)								
	Color formatting of institutional repository interface is good(increases content readability)	5(8.3 %)	7(11. 7%)	8(13. 3%)	7(11.7 %)	33(55. 0%)	3.93	1.388	A
	The system has zoom options that enable users to use contents by resizing it	2(3.3 %)	6(10. 0%)	9(15. 0%)	13(21.7 %)	30(50.0 %)	4.05	1.171	A

SDA (1) =strongly disagree, DA (2) = disagree,N (3) = Neutral, A (4) =agreeSA(5)= strongly agree, DN= Decision

The above table shows that most of respondents were agreed with the interface of institutional repository is attractive, the design of the pages is appropriate, the design is not confused for users, the design layout & colors are the same for all webpages, the font size of interface is good, color formatting of institutional repository interface is good, the system has zoom options in the mean of 3.87, 4.05, 4.07, 3.95, 4.00, 3.93, 4.05 respectively.In this factor, most of the respondents were agreed that the interface design of the institutional repository were well and standardized.

Table 4.7 usability of content in higher education institutional repository

		Respondents response					Central Tendency		
Criteria	Items	SDA	DA	N	A	SA	M	SD	DN
Content	The information presented on the site is up-to-date	24(40. 0%)	19(3 1.7%)	2(3.3 %)	7(11.7 %)	8(13.3 %)	2.27	1.43 6	DA
	Collections deposited in each community/departm ents are placed correctly	16(26. 7%)	25(4 1.7%)	7(11.7 %)	6(10.0 %)	6(10.0 %)	2.35	1.26 0	DA
	The information on the site is accurate and relevant	7(11.7 %)	26(4 3.3%)	6(10.0 %)	9(15.0 %)	12(20. 0%)	2.88	1.36 7	N
	There is no under-construction page	0	6(10. 0%)	15(25 .0%)	9(15.0	30(50.	4.05	1.08	A

				%)	0%)		0	
Terminology/terms are clear & not ambiguous	0	8(13.3%)	11(18.3%)	14(23.3%)	27(45.0%)	4.00	1.089	A
content is concise or not redundant	4(6.7%)	10(16.7%)	8(13.3%)	9(15.0%)	29(48.3%)	3.82	1.371	A
The information is sufficient to me	8(13.3%)	28(46.7%)	8(13.3%)	11(18.3%)	5(8.3%)	2.62	1.180	N

SDA (1) =strongly disagree, DA (2) = disagree,N (3) = Neutral, A (4) =agreeSA(5)= strongly agree, DN= Decision

The above table shows that majority of respondents were disagrees in the mean of 2.27and 2.35 respectively as the collections presented on the institutional repository not up-to-date and has miss placement. Respondents were neutrally agreed on the relevancy and sufficiency of information available on the institutional repository in the mean of 2.88 and 2.62 respectively. So, this needs strong checkup to the informations presented on the institutional repository. Most respondents were agreed that the institutional repository has no under-construction page, not ambiguous terms and not redundant contents in the mean of 4.05, 4.00 and 3.82 respectively. In this factor, the respondents were disagreed with placement of collections, sufficient and up-to-date collections so, the institutional repository of higher education found with usability problems in contents which needs high qualified expert.

4.1.6Qualitative Data Result

The result of interview analyzed based on the following interpretation:
Participant #1: IR administrator, Addis Ababa University
Participant #2: IR administrator and libraries and technical section head, Addis Ababa University
Participant #3: IR administrator andICT team leader, Jimma University
Participant #4: IR administrator and digital library coordinator, Jimma University

Respondents were provided their opinion in open ended questions on usability of higher learning institution IR and they list some problems as follows:

Most of the respondents especially from students' point of view providedcomment and suggestions as there was a problem in contents of higher education institutional repository; no enough thesis uploaded considering all departments, the uploaded thesis also lacked updating and missing of collection placements. Majority of the respondents from postgraduate students' perspective indicated that the selected public university of IR in Ethiopia lacks some advanced search like browse by department, publisher, advisor and publication year. Moreover, the result from the librarians' point of view also revealed that the system has complexuser interface like java server page user interface and extended markup language user interface. Slowconnection and accessibility problem was identified from all perspectives. Lack of feedback and multiple language support were also identified from librarian and student perspectives. However, the interview result all participant#1,#2,#3 and #4 revealed that IR supports both feedback and multiple language but we didn't use still now.Furthermore,the interview result from all participant#1, #2, #3 and #4 in both universities revealed that IR system enables them to recover easily from mistakes even there exist some mistakes like misspelled in title, inappropriate first name and last name of authors' when entering metadata. The IR lacksadditional feature like user statistics and plagiarism checker also listed. As they also describe, a big challenge that affect usage of IR were lack of awareness about availability of IR, lack of information literacy skill, connection problem and power breakdown were major challengesby all participant#1, #2, #3 and #4. Addis Ababa University intervieweefrom both participant#1 and #2 indicated that the Dspace of IR lack integration with Greenstone and Koha softwares. In Jimma University also by all participant #3 and #4 described the IR lacks accessibility via countryside access.

4.1.7Inferential Statistics result

The current study analyzed using linear regression analysis which is under inferential statistics to know its significance, confidentiality and the relation between the dependent (usability) and independent variables (ease of use and support, interface, content and navigation).

4.1.7.1Regression analysis output/result

Table4.8 Shows regression analysis result

Model Summaryb					
Model	R	R Square	Adjusted R Square		Std. Error of the Estimate

1	.695ª	.483	.435		1.031

a. Predictors: (Constant), ease of use and support, navigation, content, Interface Design

b. Dependent Variable: usability

Coefficientsa

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	-.527	.709		-1.948	.000	-1.948	.895
navigation	.078	.103	.077	-.129	.028	-.129	.284
content	-.018	.098	-.019	-.215	.031	-.215	.179
Interface Design	.193	.157	.177	-.121	.041	-.121	.508
ease of use and support	.195	.119	.170	-.043	.043	-.043	.433

a. Dependent Variable: usability

ANOVAª

Model	Sum of Squares	df	Mean Square	F		Sig.	
Regression	53.552	5	10.710	10.070		.050	
Residual	57.431	54	1.064				
Total	110.983	59					

a. Dependent Variable: usability

b. Predictors: (Constant), ease of use and support, navigation, content, Interface Design

Source: Research Data

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.652ª	.282	.233	1.326

a. Predictors: (Constant), navigation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.471ª	.324	.318	1.383

a. Predictors: (Constant), easeofuseandsupport

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.548ª	.300	.295	1.383

a. Predictors: (Constant), interfaceDesign			
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.789ª	.602	.597	1.382
a. Predictors: (Constant), content			

The above model summary shows that the regression model can explain 48.3% of the variance in the dependent variable. When adjusting the number of estimated parameters and study population, the model can contain 43.5% of the dependent variable's variance. The second model summary also to see the degree (how much each variable affect or explain); 28.2% affect navigation, 32.4% affect ease of use and support, 60.2% affect content and 30% affect interface design. To conclude, content is highly affect or explain usability and navigation has less effect on that.

In the above regression analysis the result indicates that, the association between navigation and usability of IR is significant. The regression result shows beta=.077; p-value=0.028, so the results indicatesthat there is positive relationship between the navigation and usability of IR, because the p- value of navigation is less than 0.05. Theregression analysis of the association between contentand usability of IR is significant. The regression result shows content has beta=-.019; p-value=0.031. This indicated, there is negative relationship between content and usability of IR.The association between interface design and usability of IR is significant. The regression result shows interface design has beta=.177; p-value=0.041. The results indicated that, that there is positive relationship between interface design and usability of IR. The association betweenease of use and usability of IR is significant. The regression result showsease of use has beta=.489; p-value=0.028, this results shown that there is positive relationship between ease of use and usability of IR. So, all the independent variables have an effect on the dependent variable (usability) since all value of significance was below 0.05.

4.2DISCUSSION OF THE FINDINGS

This section discusses about the major finding of the analysis of the data collected through questionnaires and interview.

4.2.1 Major findings of Results

4.2.1.1 Usability of higher learning institution institutional repository

As Table 4.1 indicated in the demographic (general) information,68.3% of respondents were postgraduate students. The majority of 55.0% respondents were from information science department.More than 90.0% of the respondents were male and majority of the respondents 95.0% have educational qualification of master degree. The result found that selected public higher learning institution institutional repository in Ethiopia were good. Even though, it needs improvements in its usability like utilization of multiple language and feedback support, accessibility and contents of the IR.There is a need of improvements from University ICT team leaders, IR Administrators or heads to make the institutional repository is usable.

The result revealed that, most of the respondents of selected public universities of Ethiopia visit the higher learning institution institutional repository every day. This shows that the respondents makedaily interaction with the institutional repositoryto fulfill their needs if they have an awareness of the service and enough information literacy skill. The result of interview also support to this finding.

Most of the respondents were pointed out in the open ended question they used the institutional repository for finding of thesis and dissertations since it has ETDs (Electronic Thesis and Dissertations).Interview result also indicated similar idea they use the institutional repository not only for finding of thesis and dissertations but also touploadcollections.This is in line with the finding of ALjohani (2013) most users of IR was used for the purpose of finding thesis and dissertation and for checking who cite that paper.

The respondents were asked to rate their satisfaction level with higher education institutions institutional repository usability. So, more than half of the respondents (55%) were fully satisfied including interview result. This result shows that higher education institutional repository in Ethiopia were well designed.

4.2.2 Factors that affect institutional repository usability

On factors of institutional repository usability the variables were identified with their sub-categories to identify the level of agreement on usability factors of higher education from

postgraduate students and librarians point of view with the variables (factors) of navigation, ease of use and support, interface design and content. The study found those factors were the most important factors that affectusers and administrators. Most probably the finding of this research discovered that the ease of use and support and content category was the most important factor that influenced the usability of institutional repository from students' point of view. Similar finding with this results were Tarafdar and Zhang 2005).

Navigation

In the finding of the study indicated that, for the factor of navigation of institutional repository the majority of 63.3% were agreed in the mean of 4.50. The result of interview also support to this finding. So, this shows that the navigational structure of higher education institutional repository were good.

Ease of use and Supportiveness

For ease of   use majority of 55.0% respondents agreed in the mean of 4.10. In the ease of use even there was some usability problems related connection and power breakdown the majority of finding indicated that the IR was easy to use.The finding of interview also supported to this result the institutional repository in higher education was easy to use and interact. The result indicated that the higher education institutional repository should support feedback and multiple languages which help for active and clear communication of user and system. But as the result found that majority of 50.0% and 46.7% were disagreed in the mean of 2.12 and 2.20 for both feedback and multiple language support respectively. So, the institutional repository of higher learning institutions lacks major things like multiple language and feedback support. Similar finding by Koshiyama (2015) and Calvi(2008) "the institutional repository does not give any sort of feedback to users". An institutional repository should provide the facility for users to choose the language they would like to access information or perform a particular task on the site. But, the IR of HEIR didn't design with multiple languages. The qualitative data also supported to this finding; the IR administrator of Addis Ababa said that "we didn't do more on localization or internationalization especially on localization there is need improvements. Because, the IR was designed in English but more of users can't understand that".Hasan and Abuelrub (2008)

suggested that one site can be able to entertain all its users with their cultural background or country.

Interface design

The interfaces of higher education institutional repository were found well with 55.0% of respondent's agreementin the mean of 3.93 in both universities. In the interview also found similar idea "the interface design of institutional repository was design considering its standard even the colors also arranged based on standard colors. If something happened wrong in color or font size, immediately we correct it". So, this finding is in agreement with the finding of Kim and Kim (2008) which stated that the page layout on the main page not visible enough because the menu bars are too small and the color is too dark. Therefore, institutional repository in Ethiopian higher education institution was designed very well in terms of color, font size and availability of zoom option.

Content

The majority of 40.0% and 41.7%   of respondents were disagree in the mean of 2.27 and 2.35 for content updating and correct placements of collections respectively. The majority of 46.7% were also neutral in the mean of 2.62 for sufficiency of information provided. In general the contents and collections of institutional repository need much more improvement.Therefore, the IR administrators of the higher education institutional repository should focus on presenting current/update information on the institutional repository.

4.2.3 Challenges of usage institutional repositories in selected Ethiopian selected public university

The most challenges of institutional repository in both Jimma University and Addis Ababa University were connection and breaking of electric power. Similar findings indicated by Okiki (2011) slow connection and electricity breakdown problems are identified as the most encountered problems by the respondents.Other challenges that affect usage of institutional repository were lack of awareness the availability of institutional repository and lack of information literacy skill. This is in line with the finding of Okumu (2015) information literacy skill and awareness are major challenges of IR usage.

4.2.4 Functionality and Accessibility of institutional repository features

As the respondents of interview indicated Ethiopian Higher education institutional repository contains features like browse, search, advanced search, subject category search, communities, collections, sign on to DSpace, submit and edit profile. So, as the interview result indicated those all features are functional and accessible to all except sign on to DSpace, submit and edit profile. Those three features are accessible only to the IR administrator. This is in line with the result of ALjohani (2013) sign on to Dspace doesn't provide a description situation for registering as a new user.

4.3 Proposed framework for Institutional Repository Usability

A proposed framework was designed by adopting and incorporating different literatures related to usability and study finding. The literatures are Lee and Kozar (2012), Garett et al. (2016) and Kim and Kim (2008). The finding also depends on questionnaire and interview. The major factors for institutional repository usability of current study were content, navigation, ease of use and support and interface design derived from literature the two factors accessibility and functionality also derived from finding. Under those factors there were also other sub-factors.This framework can be an input for IR designers and managers to improve the usability of higher learning institution IR.
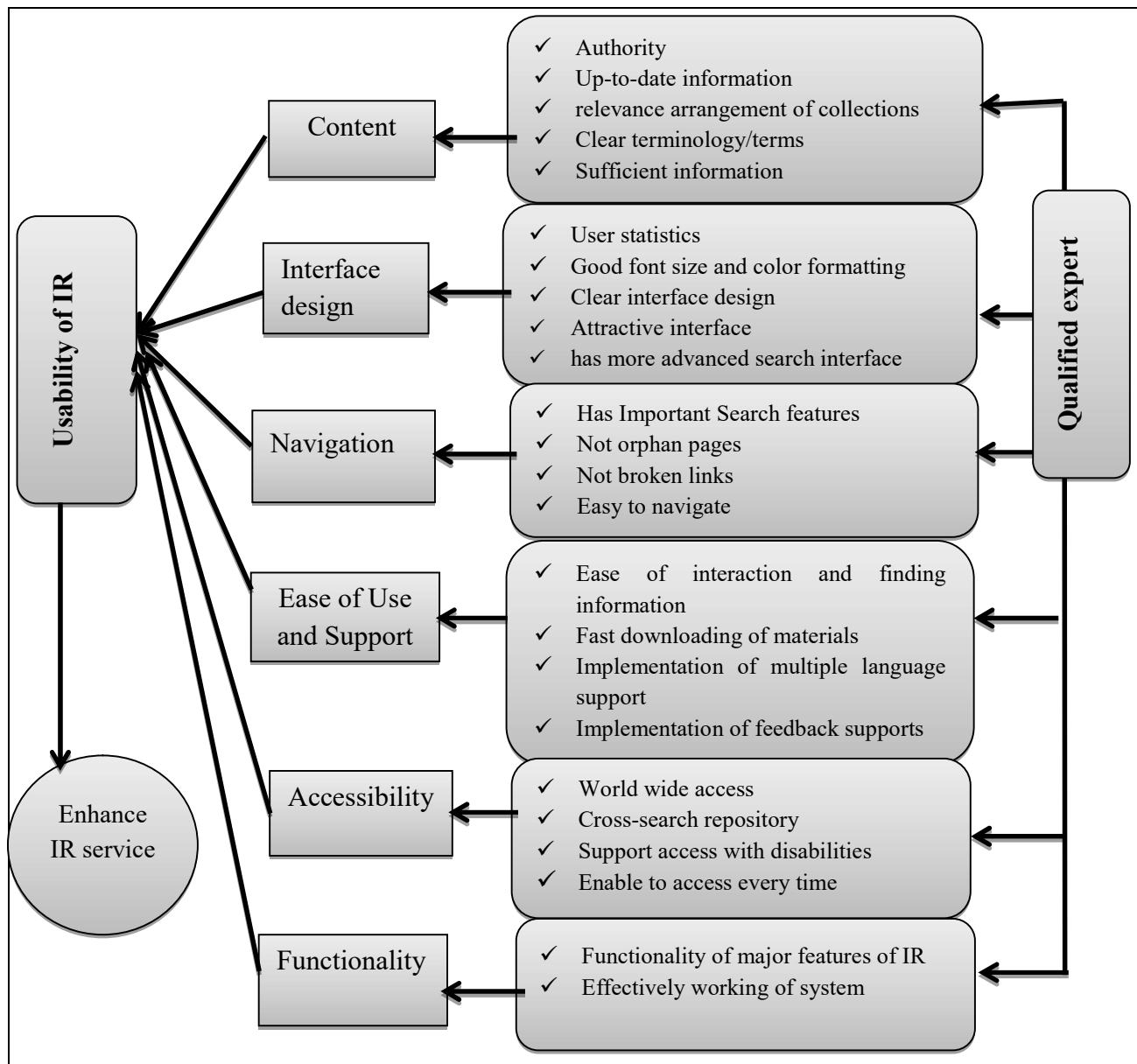
Figure 4.2 proposed framework for usability of institutional repository adopted from Lee and Kozar (2012), Garett et al. (2016) and Kim and Kim (2008).

4.3.1 Description of sub-factors for the proposed framework

The factors of the proposed framework are further divided into number of sub usability factors. Brief explanation of the main factors and their sub factors presented in this section.

Based on the finding, reviewed literature of usability evaluation criterias and other related works the sub factors identified for content are as follows:

Content: This factor is major type of usability framework factor which can be defined as the information provided on the institutional repository. This includes the following sub-factors.

- Authority: The collections deposited in the institutional repository should have authority control.
- Up-to-date information: an intellectual output on institutional repository should be uploaded on time.
- Relevance arrangement of collections: there is a need to have arrangement of intellectual outputs in related fields/departments.
- Clear terminology/terms:the terms of institutional repository must be clear and not ambiguous.
- Sufficient information: enough number of collections deposited on the IR is very important

Interface design: Interface design is describe as to what extent the interface is designed comfortable to users. This includes the following sub-factors.

- User statistics: the usage statistics report lists a cumulative count of all downloads for an item and a line graph that displays accumulation of download counts over time as well as a bar graph of download counts by month for the item.
- Good font size and color formatting: if the format of the interface is good it increases content readability
- Clear interface design: clear interface design makes users to interact without difficulty.
- Attractive interface: interface attractiveness is best for motivation of users

Navigation: Navigation is the ability to provide alternative interaction and navigating techniques.

- Has Important Search features: like go back, menu bar and forward button to facilitate search
- Not orphan pages: all the pages must have links

- Not broken links: links should be full
- Easy to navigate: no difficulty with navigating of sources

Ease of use and support: The effort that is required to operate a system once it has been understood and learned by the user is indicated to ease of use and the ability that additional information and support mechanisms readily available to enhance the system use experience also goes to supportiveness.

- Ease of interaction and finding information
- Fast downloading of materials
- Implementation of multiple language support: since all users have not the same wants and skills language support is mandatory in institutional repositories.
- Implementation of supports feedback tool: higher education institutional repository must adopt feedback support in order to be improve access to users.

Accessibility: Accessibility can be described as ease of access, free of chargefor access. In another way also accessibility is the capability of a software product to be used by persons with some type of disability.

- World wide access: allows to access throughout the world.
- Cross-search repository: all repositories in each universities search using one portal for improving access
- Support access with disabilities: the IR is good if disability persons can access.
- Enable to access every time: the institutional repository system is online every time so, users can access it.

Functionalities: Major features of institutional repository must be functional and effectively working of the system are key elements for functionality.

Generally, the major factors accessibility and functionality with their sub-factors driven from finding. The other factors navigation, ease of use and support, interface design and content are adopted with some important sub-factors from literature. Within these sub-factors authority,user statistics, feedback and multiple language support implementation and collections placement were added based on finding and by the researcher.

CHAPTER FIVE

CONCLUSION, RECOMMENDATION AND FUTURE WORK

5.1 CONCLUSION

Institutional repository is an important concept in the digital era. Institutional repositories enable institutional visibility and increase the value of institutions of higher learning. The revolution in scholarly communication brought by institution repository is vital in keeping scholarship vital and effective. It is clear that institutional repository is very powerful idea that can serve as an engine of change for institutions of higher learning.

This study examined improvements for better usability of institutional repository. As part of the study, the researcher examined administered the usability evaluation in two ways questionnaire and interview from the librarian, postgraduate students and library administrators' perspective. It also addressed a gap related to the fact that there is a lack of research investigated on the area of usability of Ethiopian educational institutional repository. This study investigated from Jimma and Addis Ababa Universitieswith 60 respondent for questionnaire and 4 responsible persons for interview.

Most of the problems identified are related toup-to-date information, miss arrangement of collections, multiple language and feedback support, lack of enough collections deposited, lack of copy right control, no enough thesis uploaded considering all departments. Most of postgraduate students' indicated that the selected public university of IR in Ethiopia lacks some advanced search like browse by department, publisher, adviser and publication year.

The result from the librarians' point of view also revealed that the system has complex user interface like java server page user interface and extended markup language user interface. Furthermore, the interview was found that IR lacks additional feature like user statistics and plagiarism checker. Major challenges that affect usability of IR were lack of awareness about IR and lack of information literacy skill. Furthermore, the result obtained from the interview indicated that the Dspace of IR lack integration with Greenstone and Koha softwares and IR lacks accessibility via countryside.

From the results, the researcher attempted to provide framework for the developers of institutional repository in higher learning institution concerning areas which need improvement

in order to obtain the advantages of having usable institutional repository. The results of this research could also be used for other universities to evaluate and improve the design and operations of their institutional repository.

5.2 RECOMMENDATIONS

Based on the findings of this research, the researcher provides the following recommendations in order to improve the usability of institutional repositories in Ethiopian Higher Education Public University.

- ✓ The research suggests that the developers of higher education institutional repository should consider the most common usability problems identified in this research in order to improve the overall usability of the universities' institutional repository.
- ✓ Those who work on institutional repository should upload the collections on time and arrange based on their related field.
- ✓ IR administrators should apply the multiple language and feedback support of institutional repository for improving access.
- ✓ University library should recruited qualified experts in order to improve usability of IR
- ✓ The library management and IR administrators has to invest time, staff and resources in marketing the institutional repository to users.
- ✓ Web based tutorials and guides should be developed to help users effectively utilize the institutional repository resources.
- ✓ This study recommends to the designers to addmore access keys for example browse by department, Publisher, publication year and adviser for enhancing browsing and searching.

5.3 FUTURE WORKS

For further study to be considered, the researcher suggested the following ideas.

- ✓ Other researchers should conduct a research or project on designing of user statistics for institutional repository.
- ✓ Other researchers should investigate a research on awareness of availability of institutional repository from students, teachers and librarian perspective.
- ✓ Researchers should conduct a research on information literacy skill of electronic resource users then it makes easy to take different respondents duringusability study of institutional repository and other related areas.
- ✓ The study suggests that further research on ethical and legal aspects of institutional repository, access and use in Ethiopia is important for decreasing of research contributor and submitter threat.
- ✓ Further research should be done on federating system (cross-repository) to search or share intellectual out puts among Ethiopian universities to improve access.
- ✓ Further research should be done on usability of IR using different models like TAM (Technology Acceptance Model) to predict theacceptance and usage of information technology in work environments.

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Appendices

Jimma University
College of Natural Sciences
Department of Information Science
Questionnaire for Post Graduate Students and librarians

Appendix A: Dear respondents,

I kindly request you to participate on this study that aims "investigating the usability study of higher education institutional repositories: case study of selected Ethiopian public university institutional repositories". The result from this response will provide important input to design a framework for improvement of usability of institutional repository system and IR service in higher learning institution in Ethiopia. The information you provide in this study will not be used for any other purpose apart from its intended academic use. Before answering the question visit the IR system; each labels and files of IR and conceive what happens and what it has.

Section I: General Information

For each of the following questions, please indicate your response by a tick **(√)** in the appropriate box.

1. From which university are you from?   JU ☐   AAU ☐

2. Sex?   Male ☐   Female ☐

3. What is your position? ☐ Postgraduate student ☐ librarian

4. What is your department? ☐ Computer Science ☐ Information Technology

☐ Information System   ☐ Information Science ☐ school of computing

5. What is your educational status? BSc ☐   MSc ☐   PhD Candidate ☐ PhD ☐

Section II: Usability of institutional repository in higher leaning institution

Please indicate your agreement or your response by a tick **(√).**

1. How often do you visit the website of institutional repository?

Every day ☐   Sometimes ☐ Weekly ☐   Monthly ☐

2. For what purpose you are using the institutional repository your organization?

_____

_____

_____

4. What overall rating would you give to the usability of your organization institutional repository?

Bad ☐   Poor ☐   Moderate ☐   Good ☐   Excellent ☐

Section III: Questionnaires for Institutional Repository Users (for students and librarians)

Usability of Higher Education Institutional Repository factors

Question 1-4 please Provide your opinion on the appropriate place (in the below 5-likert scale)

1	Navigation	Strongly disagree(1)	Disagree(2)	Neutral(3)	Agree(4)	strongly agree(5)
1	It is easy to go to the home page from any sub-page of the site					
2	Links are working properly and are not confusing so that the user knows what to expect from the destination page					
3	The site has not broken links					
4	The site has not orphan pages					
5	The address(URL) represents the name of the institution					
6	It is easy to memorize in relation to what the institution does					
7	It has important search features like menu bar, go back- and-forward button, etc.) to obtain the target information					
3	**Ease of use and support**					
1	Interaction with the institutional repository system is easy					
2	Finding the required information is easy					
3	It facilitate fast information retrieval					
4	The institutional repository provides fast downloading of collections					
5	The institutional repository provides multiple language support					
6	It supports feedback tool that help faster and efficient communication between the system and users					
3	**Interface Design**					

1	The interface is attractive so that it impresses the potential users					
2	The design of the pages is appropriate					
3	The design is not confused for users					
4	The design layout & colors are the same for all webpages					
5	Font size of institutional repository interface is good(increases content readability)					
6	Color formatting of institutional repository interface is good(increases content readability)					
7	The system has zoom options that enable users to use contents by resizing it					
4	**Content**					
1	The information presented on the site is up-to-date					
2	Collections deposited in each community/departments are placed correctly					
3	The information on the site is accurate and relevant					
4	There is no under-construction pages					
5	Terminology/terms are clear & not ambiguous					
6	content is concise or not redundant					
7	The information is sufficient to me					

6. Do you have any other suggestion and comment for the improvement of usability IR?

_____
_____
_____
_____

Section IV:Interview questions for librarians who are working on institutional repository

Questions related to usability of institutional repository interface, navigation, ease of use and support and content as well as functionality of IR features

1. Isthe institutional repository of your university simple and easy to use? If no, what is the problem and your suggestion?

_____
_____

2. How do you describe the font size of the system? If you say not good, please specify the problem and your suggestion?

_____
_____

3. How do you describe visual attractiveness of the system? If you say not good, please specify the problem and your idea?

_____
_____

4. How do you describe the brightness/color of the interface?If you say not good, please specify the problem and your suggestion?

_____
_____

5. Does the system provide relevantand sufficient information to users? If no, please specify the problem and your idea?

_____
_____

6. Does the system able to recover quickly and easily from mistakes? If no, please specify the problem and your suggestion?

_____
_____

7.Is the location of contents and collections in your institution good? If no, please specify the problem and your suggestion?

_____
_____

8. Is the navigational structure of institutional repository is wonder?If no, why?

_____
_____

9. Doesthe following features of institutional repository are functional?

- Browse
- Search
- Advanced Search
- Subject Category Search

- Communities
- Collections
- Sign on to DSpace
- Submit
- File Formats
- Edit Profile

10. In the above question, if the features are not functional please explain briefly the problem and your suggestion

_____
_____
_____
_____
_____
_____

11. What new features that you would like to add on the institutional repository?

_____
_____

12. What are the challenges that affect for effective usage of Institutional repository?

_____
_____
_____

13. Do you have any other comments and suggestions for the improvement of your organization institutional repository usability?

_____
_____
_____

Thank you for your cooperation!!!