ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCES

SCHOOL OF INFORMATION SCIENCE

Usage of Open Access Institutional Repositories by Postgraduates Students at Addis Ababa University

By: Hiwot Andargachew

ADVISOR: Temtim Assefa (PhD)

September, 2020

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DECLARATION

This thesis has not previously been accepted for any degree and is not being concurrently submitted in candidature for any degree in any university.

Signature: _____

Hiwot Andargachew

The thesis has been submitted for examination with my approval as university advisor.

Signature: _____

Temtim Assefa (PhD)

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Hiwot Andargachew

Addis Ababa, Ethiopia

DEDICATION

I am very happy to dedicate this thesis work to my beloved partner Ato Meseret Assefa for his love, support and encouragement. He was inspiring me all times through both ups and downs of my educational life. Thank you for everything you gave me. Dear my mother Meaza work Abi and my Father Andargachew Gobaw thank you for growing me in a very good manner. I have no word to say thank you.

ABSTRACT

The rapid development in Information and communication technology (ICT) has broken barriers to information and open a new way for scholars in higher education institutions to communicate and disseminate their research findings. Universities have established open access institutional repositories in an effort to capture research results produced by their students and academics. However there is very limited literature on satisfaction of users towards open access institutional repositories in Ethiopia and users satisfaction have not been studied.

The aim of this study is to explore the current level usage and satisfaction of postgraduate students towards open access institutional repositories in Addis Ababa University using a conceptual model adapted by Delone and McLean (2003) and the study of Compeau & Higgins (1995) which focused on variable Self-Efficacy. The study reviewed literature on open access institutional repository and user satisfaction. A mixed research approach was used to collect data from respondents. Due to corona virus pandemic, the data was collected by administering online questionnaires based on adapted model and Phone interview. The questionnaire's was sent to postgraduate students of AAU via email. Descriptive statistics and linear regression analysis were applied to perform the data analysis.

The results fully supported the effect of the quality antecedents' towards user satisfaction of postgraduate students. From the quality antecedents,' Service quality have been found to be major determinant factor which contributed (34.3%) to user satisfaction of the system. Regarding to behavioral intention information quality and self-efficacy have been found to be statistically significant and information quality has been identified as a dominant factor which contributed (63.4%) to behavioral intention to use the system. Furthermore, users satisfaction of postgraduate students towards the OAIR system have shown to be the main factor which contributed (48%) actual usage of the system. The study concludes and recommends that the university library and other stakeholders including the management of the university should promote the availability and accessibility of thesis and dissertations and related services to make the system better. Furthermore, In order to make the system more usable by users, design modification is a needed. The system should include frequently asked questions section and should be integrated with online help/support services to allow users to obtain materials they are interested in.

Keywords: Open access, Institutional Repository, Addis Ababa University**,** User satisfaction, Mclean and Delone model, descriptive statistics, Service quality

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LIST OF ACRONYMS

AAU ……..…Addis Ababa University

AAUL …….....Addis Ababa University Library

AAU-IR……....Addis Ababa University Institutional Repository

AU……Actual System Usage

BI……..…Behavioural Intention to use

DOAJ……....Directory of Open Access Journals

EIFL……..Electronic Information Libraries

EJOL……..…Ethiopian Journals Online

FBE…….. Faculty of Business and Economics Campus

ICT…….…...Information Communication Technology

IQ…….…….Information Quality

IR……..Institutional repository

IDT……Innovation Diffusion Theory

MC……Main Campus

MoSHE ……Ministry of Science and Higher Education of Ethiopia

MM…….……..Mixed Methods Research

OA……Open access

OAIR……Open access Institutional repository

OJS……...……Open Journal System

PGS…….…….….Postgraduate Student

SPSS ……..…….….Statistical Package for Social Sciences

ServQ……..…….….Service Quality

SQ…….……System Quality

SE…….…….…Self-Efficacy

SCT……Social Cognitive Theory

TAM……..Techonology Acceptance Model

TPB…….....Theory of Planned Behavior

TRA……Theory of Reasoned Action

UCAA……..…….…University College of Addis Ababa

UTAUT…….....Unified Theory of Acceptance and Use of Technology

US……..…User Satisfaction

Chapter One
Introduction

1.1. Background of the Study

Following the innovation of the internet and the World Wide Web, many organizations have been interested to digitize their resource and automate their services. The influence and impact of technological innovations affects all aspects of human life in general and human learning life in particular. In the era of Information Communication Technology (ICT), the format of information and its access have been changed dramatically (Renu & Bhanu, 2018). Higher educational institutions in many countries believe that these developments offer rich opportunities to embed technological innovations within the learning environment to enhance information collection, preservation, and dissemination. Creation of institutional repositories and open access journal is one of the main activities of every higher educational institution (Christian, 2008).

Open Access means

> "*free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself"* (BOAI, 2002).

According to Suber (2012) Open Access is defined as a digital, online, free of charge, and free of most copyright and licensing restrictions. Research materials which are made available to the general public, free of charge include: data and datasets, books and scholarly research articles other kinds of articles (Open Access Resources, 2019). OA authors have chosen to share freely so that anyone can use their works legally without permission or fees. OA resources are not limited only to open access journals but they may be found in different forms, such as open e-book, open databases, open access repositories and institutional depositories (Prince & Saravanan, 2015).

Institutional repositories are database systems that help to capture, disseminate and preserve scholarly works created in digital form by members of the institution and accessible to end user both within and outside the institution (Crow, 2002a). Institutional repositories are inevitable for long-term preservation and to provide perpetual access. Institutional repositories encompass more open scholarship and demonstrate cultural diversity of organizations through their collections, while the growth of literature over the years provides more of a metric indicator of institutions (Leila & Mina, 2018). Setting up institutional repositories necessitates user engagement, retrieval efficiencies, testing and evaluation of systems, and strong support from all stakeholders.

Universities and research institutions that support and encourage open access to scholarly outputs have created institutional repositories to facilitate the dissemination, access, reuse and preservation of the work arising from the scientific and academic activity of their staff (Serrano-Vicente, R.Melerob, & Abadal, 2016). In spite of the wide variety of research endeavor and production of information and knowledge in the country, the Ethiopian research and academic community predominantly have been at the receiving end of research-based information for quite some time. This was due to lack of proper infrastructure and means of communicating such research results generated locally (Global Open Access Portal, 2019).

Open access was relatively a recent trend in Ethiopia. In October 2019 Ethiopia adopted a national open access policy for higher education initiated by the Ministry of Science and Higher Education of Ethiopia (MoSHE). The new national open access policy is expected to transform research and education in the country and allows open access to all published articles, theses, dissertations and data resulting from publicly-funded researches conducted by staff and students at universities that are run by the Ministry (Solomon, 2019).The new open access policy is important to enhance the visibility of Ethiopian researches to the world and minimize duplication of researches as well as acknowledge Ethiopian researchers. Knowing the importance of open access institutional repositories, universities are required to adopt their own policy that fit their institution (Solomon, 2019).Addis Ababa University, which has a large number of postgraduate students and staff involved in research, has initiated research outcomes to be available openly for all academic and research institutions in the country to make research outcomes openly available for all academic and research institutions in the country (Abinew & Sreenivasarao, 2013). Creating and managing open access institutional repository incurs a significant amount of

budget and the expense should bring some positive impact in achieving the overall goal of the organization. However the level of users' system (open access institutional repositories) usage and satisfaction is not known. Knowing user satisfaction and usage of the system is important to improve system functionalities and service provided. The research outcome also indicate whether the money invested on the institutional repository development brings value or not.

1.2. Statement of the Problem

Recently most of the universities in Ethiopia have started to adopt new technologies to enhance their educational qualities. Among the adopted technologies OAIR systems are one of the most widely used or implemented. Research in the domain of open access institutional repository development and usage is gaining much attention globally and due to that many institutions in the developed nations have built their institutional repositories and started to give open access to those who are interested to use IR resources. But the use of OAIRs in African academic institutions currently faces serious challenges Particularly in sub-Saharan Africa except South African, Kenyan and Nigerian universities The Directory of Open Access Repositories (DOAR, 2018) indicates that there are 33 (21%), 29 (18%) and 21 (13%) active OAIRs in university libraries in South Africa, Kenya and Nigeria respectively (Adeyemi et al., 2017).

Open access institutional repositories have advantage to both the academic institution and individuals especially postgraduate students. Postgraduate students are future researchers. They are main beneficiaries of open access institutional repositories and they can utilize materials available on OAIR. In addition to that they need to access journal articles, thesis, books and dissertations to prepare different research papers on different topics. Awareness of Open access Institutional repositories have been studied in previous researches. This includes research by Renu & Bhanu, (2018) and Prince & Saravanan, (2015). However, usage of open access institutional repositories by postgraduate students have not been studied adequately. Therefore, further study is needed to investigate level of usage of open access institutional repositories at Addis Ababa University.

Many authors underlined that studying user satisfaction of system usage is very important to assess usability and functionality of the system. Conducting system usage assessment of an OAIR system from the user perspective provides to improve system usability. However, system

usage assessment have not been carried out. Because of this knowledge gap open access repositories remain underutilized despite their potential benefits.

According to Sarker, Davis, & Tiropanis, (2010) OAIR are also important for universities in helping to capture, manage and share intellectual assets and they are broadly being recognized as an essential infrastructure to respond the higher education challenges in the digital world. When I was taking my msc courses first year, instructors suggests students to use OAIR systems to look for different resources.But, I found that majority of students werenot motivated to use the system.For this reason I was inspired to investiget factors and challenges that effects postgraduate students from using the system as expected.

Several studies have applied DeLone and McLean IS success model in e-learning system,web portal, Knowledge Management System, e-commerce ERP system (Yakubu & Dasuki, 2018; Ajoye,2014; Wu & Wang, 2006; Tesfu, 2018). Yakubu & Dasuki (2018) assesed the success factor responsible for acceptance of e-learning system. In their findings information quality (IQ) and service quality(SQ) have significantly affected user satisfaction when using the Canvas system. There was full support for the relationship between behavioral intention and user satisfaction of students on their actual usage of Canvas. Similar model was used by Shaltoni etal. (2015) to evaluate the web portal usage by universities in Jordan. They found a significant effect of service availability and quality on students' satisfaction with the system. It is important to know why some students use the OAIR whereas others do not wish to use these resources. However, no other researchers used DeLone and McLean IS success model to investigate about open access institutional repositories in Ethiopian context. Open access institutional repository systems are not mandatory systems like ERP systems that are used in daily activities, rather voluntary systems that users use this system due to their personal interest and motivation. Therefore, knowing why users use this system will help the service providers to tailor their system design to meet their user requirements and any investment on open access repositories will also bring rewarding benefits to the overall improvement of education quality and the country's socio-economic development.

Analyzing factors affecting usage of open access institutional repositories may provide insight into improve OAIRs in Ethiopia. Information system studies by Dulle, (2010) and Lowga and Questier (2014) showed that understanding the different factors that contribute to IS success is crucial. However these studies are concerned with using only one model with a specific attribute.

Therefore this study seeks to investigate knowledge regarding to the level of usage of OAIR by postgraduate students by applying Delone and McLean IS success as theoretical framework. Different from the previous studies, which were conducted using UTAUT model, the present study was conducted using factors of McLean and Delone IS success model and a study of Campeau & Higgins (1995) which focused on variable Self-Efficacy. In addition, exploring factors that predict postgraduate students' usage of OAIR may provide insight to effective ways to improve OAIR of AAU in specific and Ethiopia in general. Therefore this research aims to explore the different factors that affect usage of OAIR system by postgraduate students at AAU.

Different researchers identified different challenges affecting utilizations of different information system. For instance, Okoye & Ejikeme (2011) identified inadequate skills to navigate the Internet; unstable power supply; unavailability of Internet facilities; unstable financial supports and lack of knowledge of existence of Open Access journals as constraints to use of Open Access. Musa (2016) revealed poor ICT infrastructures; inadequate funding for building and upgrading ICT infrastructures; low level of awareness; unstable power supply; technological barriers; unavailability and slow Internet connectivity; lack of sensitization to adopt Open Access; lack of ICT skills and inadequate advocacy for Open Access in academic and research institutes as major constraint to Open Access. Ezema (2011) reported funding shortages, language barriers, inadequate ICT infrastructure and a lack of highly qualified personnel. Wuraola, Sowemimo, & Rahmon (2017) identified low quality of Open Access research articles and poor awareness of existence of journals and other databases in open access medium have been identified as major challenges to use of open access as publishing medium. Challenges for using OAIR may differ from country to country, from university to university even varies from different categories of research communities or disciplines Therefore, it is necessary to examine these challenges that influence postgraduate students actual usage of the OAIR system in AAU context.

Hence, in this study, an attempt has been made to explore the current level of usage and users satisfaction of open access institutional repositories by postgraduate students in Addis Ababa University.

1.2.1 Research Questions

The following are the research questions to be addressed in this study.

1. What is the current level of usage and satisfaction of the PG students towards open access institutional repositories?
2. What are the factors that predict usage of open access institutional repositories?
3. What are the challenges on usage of open access institutional repositories?

1.3. Objectives of the study

1.3.1. General objective

The general objective of the study is to explore the current level usage and satisfaction of postgraduate students towards open access institutional repositories in Addis Ababa University.

1.3.2. Specific Objectives

This study has the following specific objectives:

- To assess the current level of actual usage of open access institutional repositories by postgraduate students at AAU;
- To investigate the factors that predict actual usage of open access institutional repositories;
- To find out the challenges of postgraduate students face while using open access institutional repositories;

1.4. Significance of the study

The study will have a significant contribution for both theory and practice. Researchers will be benefited from the theoretical contribution since the study tries to fill the existing gap towards using the open access institutional repositories. It will have contribution to information system acceptance theories by adding new constructs or validating existing constructs and relationship applicability to developing countries context. It has also practical contribution to managers and practitioners working in Addis University libraries to design, develop (adopt and adapt) the new technology in a way that can satisfy end users and address problems related to open access institutional repositories. It also investigates the usage of open access journals and institutional repositories by PG students. The research result will suggest scientific technique to improvements on the content, functionality and usability of the system. Furthermore, the output

of this study will improve the accessibility and availability of recent information in e-journal, digital libraries and institutional repositories. The research findings can also be usable to other higher learning institutions in the country. Universities can utilize from the research results not only as an input but also a point of reference for PG students and researchers who want to conduct more research in the area.

1.5. Scope and Limitation of the Study

The scope of this research is limited to assessing the level of usage and satisfaction of postgraduate students towards open access institutional repositories via using a conceptual model that helps to assess the level of usage and satisfaction of OAIR the system based on the updated DeLone and McLean IS success model. Due to current coronavirus pandemic, this study is limited only to Post graduate students' of Addis Ababa University.

1.6. Organizations of the Thesis

This thesis is organized in to five chapters.

Chapter One presents background of the study, statement of the problem and its justification, objective of the study; scope of the study and the significance of the study.

Chapter Two has tried to address the review of related literature about open access institutional repository, types, benefits and challenges of OAIR, and at the end summary of the chapter

Chapter three defines and explains the research model and the hypothesis development followed in this study, research design and methodology of the study including the method used and the purpose of data collection instrument; It goes further to explain about the data analysis technique used and also talks about the reliability and validity of the collected data.

Chapter four is mainly devoted to present the analysis and the interpretation of quantitative and qualitative results, linear regression, hypothesis testing and analysis of the major findings data.. Finally, discussion and summary of analysis results have been made.

Finally, **chapter five** highlights and presents the conclusions, recommendations and directions for future work.

List of references and appendices are shown at the end of the paper.

Chapter Two
Literature Review

2.1. Introduction

In this section contains the literature review and related works which begins by describing introduction about open access institutional repositories, and the current context of open access institutional repositories in Ethiopia. It starts by discussing about the major concepts and definitions of open access, types of open access, its benefit and challenges. Again related works and other related concepts on usage and satisfaction of OAIR was discussed. Then it continued with discussing with the Delone and McLean IS success models that helps to figured out the factors through reviewing extent literatures about the measuring the level of usage and satisfaction of post graduate students towards open access institutional repositories.

2.2. Defining scholarly communication

The rapid development in Information and communication technology (ICT) has broken barriers to information and open a new way for scholars in higher education institutions to communicate and disseminate their research finding to one another or to the worlds (Rosenberg, 2005). The adoption on use of ICTs by individuals and organization is increased more than before. Scholarly communication can be defined as the system through which research and other scholarly writings are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use. The system includes both formal means of communication, such as publication in peer-reviewed journals, and informal channels (UNESCO, 2015). It is also defined as process creation transformation, evaluation, dissemination and preservation of knowledge related to research. There are three major players in the scholarly communication system, namely; scholars (including funders and host institutions generate knowledge), publishers (responsible for quality control, production and distribution of knowledge), and librarians (manage access, navigation and long term preservation of knowledge).

The most common method of scholarly communication till the recent past has been through writing up the findings of research into a book, or an article to be published in a scholarly journal. But with the advent of internet and other ICT (Information Communication Technology)

applications there is a major shift in the scholarly communication process from print to electronic (Prince, 2015).

Most universities across the globe, including Ethiopian, have established open access institutional repositories in an effort to capture research results produced by their academics and enable access to the information while at the same time increasing their visibility and, in turn getting returns on their investment. It remains to be established if the institutions have achieved that goal. Technology enables innovative scholarship and presents new alternatives to access research findings whilst the economy forces universities to examine business models and assess return on investment. The changing communication technologies and ways of information dissemination, such as, OA publishing systems (which include institutional repositories) have apparently, transformed scholarly publishing to e-scholarship. The traditional communication system did not encourage sharing of research processes within or outside the research community. It had a demarcated target audience for its content and communities outside the university could not access the content easily since they did not have access to the university libraries (Christian, 2008). The affordances of the digital landscape have, however, transformed all this by enabling new practices which now allow the once excluded communities to gain access to the content once meant for the privileged few.

2.3. Open access

Open access emerged during the late 1990s. Such as Harnad (2011)the American Scientist Open Access Forum had proposed in 1998 that research funders and universities should require scholars to self-archive their research on OA. It was focused on making public-funded research freely available to all without any geographical boundary. The term open access aims at the free availability of the peer-reviewed scholarly journal literature on the Internet so that the users can use the information in any way they like for lawful purposes, transcending the financial, copyright and technical barriers. Open Access is the free availability of research outputs, to anyone, anywhere, without the relentless restrictions on use, normally made obligatory by publishers' copyright agreements (Tapfuma, 2017). The first institution in the world to adopt an OA deposit mandate was the School of Electronics and Computer Science at Southampton University (United Kingdom (UK)) in 2002. According to Tapfuma (2017), adoption was by a portion of the university community but in 2004 the Queensland University of Technology

(Australia) was first in adopting a university-wide OA self-archiving mandate. In Europe, the first university-wide OA mandate was adopted by the University of Minho (Portugal) also in 2004. In the same year, the UK Parliamentary Select Committee on Science and Technology also made a recommendation, in 2004, for universities and research funders to mandate OA self-archiving; the government failed to act on this recommendation at the time but surprisingly all the research funders heeded the recommendation by adopting an OA mandate, with the Welcome Trust being the first to do so in 2005 (Harnad 2011, Tapfuma, 2017)

The definition of open access was explained in three different statements: (i) the Budapest Open Access Initiative (February 2002), (ii) the Bethesda statement on open access publishing (June 2003), (iii) Berlin declaration on open access to knowledge in the Science and Humanities (October 2003).

The Budapest Open Access Initiative (BOAI) defined the concept of open access as

> *"free availability on the public internet, permitting any user to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited"* (BOAI, 2002).

Yang and Li (2015) expressed the defination of BOAI as Budapest position on how to achieve OA goals better by stating that there are two primary means for achieving OA goals, namely, Gold OA or "author pays", achieved by publishing in a peer reviewed, scholarly OA journal in which articles are freely available online, and "Green" OA or "self-archiving", achieved by publishing in any peer-reviewed journal and then depositing a peer-reviewed version or preprint of the article in an OA repository.

The Berlin Declaration of Open Access (2003) also defines open access as a new mode of scholarly communication through which "the author(s) and right holder(s) of such contribution grant(s) to all users a free, worldwide right of access to, and a license to copy, use, distribute, transmit, and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of origin". Suber (2012)

define open access were as combinations of the above three definitions to BBB definition by removing price and permission barriers.

2.3.1. Open Access Institutional repository

The worldwide development of open access institutional repositories by universities, research institutes and academic disciplines has seen widespread sharing of journal articles, electronic thesis and dissertations. The increasing costs of journal subscriptions and motivated by the great potential the Internet offered for disseminating knowledge, researchers and their institutions and disciplines have combined to provide greater access to materials (Prince, 2015).

According to Prince (2015), an institutional repository (IR) is an online archive for collecting, preserving, and disseminating the intellectual output of an institution in digital form. According to Suber (2012), repository is an important source of academic institutions. In the words of open access, a repository is an online database of open access works. Repositories don't perform their own peer-review, but they may host articles of peer reviewed elsewhere (MacDonald, 2011). In addition they frequently host refereed preprints, electronic theses and dissertation, book or book chapters, datasets, and digitized print works from the institutions library. IRs aim to host the research output of an institution (Suber, 2012, Prince, 2015). Institutional repositories (IRs) are also known as digital repositories, or open access repositories. There are four types of repository publications: the subject-based repository, the research repository, the national repository system and the institutional repository (Prince, 2015). IRs are widely seen as the fastest route to open access for the widest range of scholarly and research literature, since they allow authors to publish in their choice of journals while providing the broadened access without pay barriers, the hallmark of open access publishing (Grundmann, 2009).

Open Access institutional repositories (or digital archives) are digital collections that make their contents freely available over the Internet. These digital repositories collect the research output of the members of a university's research community and support the archiving and long-term preservation of the institution's intellectual output (Lamptey & Corletey, 2011). As sited by Prince (2015) mostly institutional repositories are hosted within academic libraries around the world to digitally collect and preserve academic papers and documents in order to make them freely accessible to the students, faculty and the public (Swan, 2009).

Open access institutional repositories play an important role in 21st century's higher education. Also it consists of formally organized and managed collections of digital content generated by faculty, staff, and students at the institution. Open access institutional repositories are important for universities in helping to capture, manage and share intellectual assets and they are broadly being recognized as an essential infrastructure to respond the higher education challenges in the digital world (Sarker, Davis, & Tiropanis, 2010). Repositories and the relationship with open access movement constitute new trend in scholarly communication worldwide, the need for wider access to scientific data with the objective of democratizing the dissemination of research results and the cost especially of scientific journals coupled with reduced library budgets has given rise to a strong movement that aims at free online access to research output (Okumu, 2015)

According to Lynch (2003) "a university- based 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. It is most essentially an organizational commitment to the stewardship of these digital materials, including long-term preservation where appropriate, as well as organization and access or distribution." University based-Institutional repositories play a key role in showing the information that is locally available in university repositories. This repository is essentially being used for acquisition, preservation and dissemination of locally-generated scholarly information.

Material that were deposited in to the institutional repositories includes dissertations, theses, course notes, conference proceedings, symposiums, magazines, review articles, teaching and learning objects. This material used by user to access articles and other relevant resources and information for research and learning purposes. These university repositories provide scholars with broader knowledge related to the research that is carried out by the individual or groups in the specific area of interest. Academicians download the papers from different IRs and review the literature to identify knowledge gaps. Academic institutions such as universities have predicted IRs as an essential part of higher education, because without providing knowledge through these IRs one cannot fill the gaps and challenges of the modern day (Asadi etal, 2019). OAIRs plays a role and is considered as the engine of educational institutions (Sarker, Davis, & Tiropanis, 2010).

2.3.2. Roads to open access

Depending on the availability of resources that libraries and institutions give preference, there are two ways of access to scientific communication. These are Gold road or open access journals and Green road or Open Access Repositories/Archives (Christian, 2008).

2.3.2.1. The Gold Road

Gold road is synonymous with open access journal publishing, which is a model of scholarly publication that makes are peer-reviewed journal articles openly and freely accessible to the public via Internet “without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself (BOAI, 2002). Directory of Open Access Journals (DOAJ) defines open access journals as "open access journals are journals that use a funding model that does not charge readers or their institutions for access" (DOAJ, 2003). These journals provide free access to all articles and utilize a form of licensing that puts minimal restrictions on the use of articles.

2.3.2.2. The Green road

This route is also known as Open Access Repositories. Green open access involves publishing in a subscription-based journal but also self-archiving of an author’s pre-print or post-print articles on the personal web page of the author, a subject or discipline-based repository or to an institutional repository. This is a model of scholarly publishing whereby researchers and academics make pre-print or post-print copies of their research work or publications available in open access digital repositories or archives (Christian, 2008). Pre-print means an article that do not conduct peer review and that will never submitted to any serial and post-print article means an article reflect changes made during the peer review and editorial process or an article after publication. Green Open Access also referred to as self-archiving, is the practice of placing a version of an author's manuscript into a repository, making it freely accessible for everyone. The version that can be deposited into a repository is dependent on the funder or publisher.

Institutional repository is a digital collection of intellectual output, such as research articles, theses and teaching materials, produced by the members of an institution, stored on the institution's server. Institutional repositories allow for the free access these materials and also provide a way of storing and preserving them (Crow, 2002a). A Disciplinary repository, also

known as Cross Institutional Repository, is a freely available digital collection of research output of a particular discipline or related disciplines. In personal home page when an author place their work on their own website or server called self-archiving. Self-archiving is the cost free way to make publication visible. There are two fold benefits of self-archiving "increase m citation rate" and "research cycle" is enhanced and accelerated when results are available on an open access basis. For example In Research Gate author place his /her article for other researchers to access it.

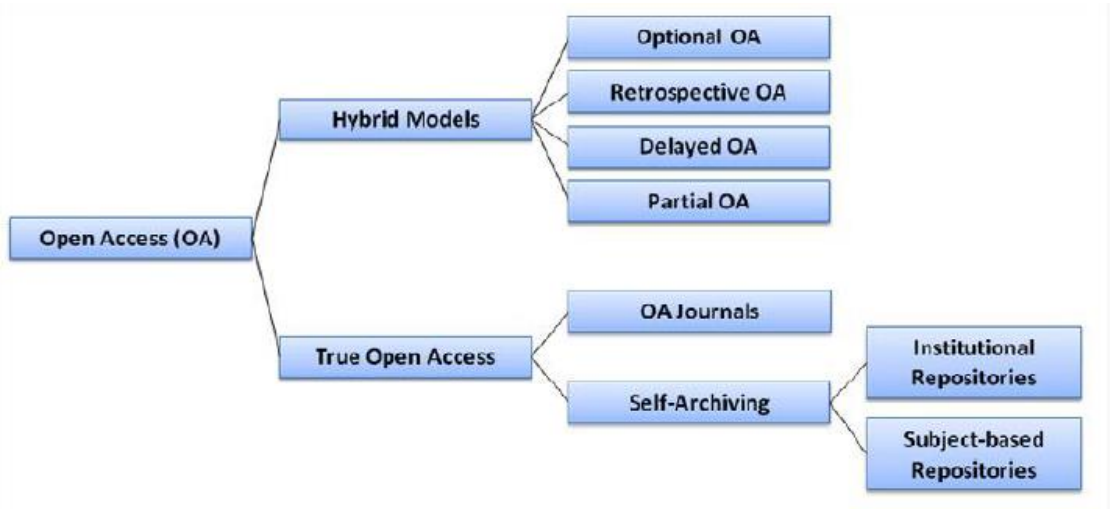


Figure 2.1. Different approaches of OA to scholarly literature, source (Tapfuma, 2017)

In addition to the two predominantly available ways of open access publications, there are some other open access models, namely Hybrid OA, Delayed OA, Short-term OA, Selected OA, and Partial OA. Hybrid open access is the one in which the publishers publish articles in toll-access scholarly journals, after receiving certain article processing charges from the authors. In the Delayed OA model, publishers offer free access after a specified period, anywhere from 6 months to 2 years. In the Short-term OA model, publishers offer free access until a specified period, anywhere from 6 months to 1 year. Thereafter, contents are available to subscribers only. The model in which publishers selectively offer free access to selected contents only is known as selected OA. Other contents are available to subscribers only.

In the Partial OA model, publishers selectively offer free access to contents of particular sections only, e.g., research papers, but not review papers. Other contents are available to subscribers only. Partial OA refers to journals that allow free access to parts of their content, such as, the editorial, table of contents or abstract. Some journals also allow free provision of

pre-prints of articles that are to be published in the forthcoming issue, for a short period (Tapfuma, 2017). Optional (hybrid OA) refers to publishers who allow authors to decide whether to make their particular article openly available or not and "Through payment of a fee, the author can assure the free accessibility of her [or his] work" (Lewis, 2012). "Hybrid OA and delayed OA journals could influence libraries to require publishers to lower subscription fees since some of the articles in the hybrid journals are free while for delayed OA journals, where mandates of funders and institutions require authors to deposit versions of articles, to institutional repositories, libraries could cancel subscriptions to journals that may be available in their repositories (Lewis, 2012). Lewis (2012) projects a situation where the hybrid and delayed OA journals are likely to switch to gold OA particularly so as indexing and discoverability of green OA articles improves. This confirms Harnad's (2011) view that green OA self-archiving should precede gold OA, if the war against exorbitant journal prices is to be won.Usually in Gold OA and Hybrid OA models; publishers publish articles with Creative Commons (CC) licenses. These two models belong to libre OA category. OA contents available with other four models do not explicitly carry CC or similar licenses. These four models mainly belong to Gratis OA category.

2.3.3. Benefits of open access institutional repository

An open access institutional repository contributes not only to the individuals in the host institutions but also contribute to host institutions itself. It increases the visibility prestige and exposure for the work done in the institution. In addition the benefits of OAIRs have been expressed by (Crow 2002a, 2002b) that it increase control over the digital assets of the university, increase public value of contributors, maximize access to the results of publicly funded research and preservation (Lynch, 2003). OAIRs is increasingly deployed in academic institutions to manage a variety of digital content including educational, research, and archival materials.

Mohammed (2013) list the benefits of OAIRs, 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.

OAIRs provides numerous benefits to researchers, journals, publishers, funding instituions, academic instituion and citizens around the world. The benefits of using open access listed as follows as cited by (Prince, 2015; Suber, 2012).

1. **Teaching staff and students:** By putting rich and poor on an equal footing, open access provides free articles for teachers, students and other academic community.
2. **Authors :** OA gives authors a worldwide audience larger than that of any subscription-based journal, no matter how prestigious or popular, and demonstrably increases the visibility and their impact of their
3. **Journals and publishers :** OA makes their articles more visible, discoverable, retrievable, and useful. If a journal is OA, then it can use this superior visibility to attract submissions and advertising, not to mention readers and citations.
4. **Funding institution:** A increases the return on their investment in research, making the results of the funded research more widely available, more discoverable, more retrievable, and more useful. Thus OA provides fairness to taxpayers by providing open access to the results of publicly-funded research.
5. **Citizines:** OA gives them access to peer-reviewed research, which is unavailable in public libraries, and gives them access to the research for which they pay taxes. OA accelerates not only research but the translation of research into new medicines, useful technologies, solved problems, and informed decisions that benefit everyone.
6. **Readers:** Readers around the globe can have barrier free access to the latest literature and research findings.
7. **Society:** Society as a whole benefits from an expanded and accelerated research cycle in which research can advance more effectively because researchers have immediate access to all the findings they need.
8. **Libraries:** OA solves the pricing and permission crisis for scholarly journals. OA also serves library interests in other indirect ways. Librarians want to help users find the information they need, regardless of the budget-enforced limits on the library's own collection. Academic librarians want to help faculties increase their audience and impact, and help the university raise its research profile.
9. **Universitie**s: Universities benefit from their researchers' increased impact and increase their visibility. OA reduces their journal expenses and advances their mission to share knowledge

10. **Government:** As funders of research, governments benefit from OA in all the ways that funding agencies do. OA also promotes democracy by sharing government information as rapidly and widely as possible.
11. **Nation:** Open access incorporates local research into all interoperable network of global knowledge; increases impact of local research, providing new contacts and research partnerships for authors; removes professional isolation and strengthens economies through developing a strong and independent national science base.

2.3.4. Challenges of Using Open access Institutional reposiraty

The uptake of institutional repositories and Open Access archives on the Africa continent has been slow due to issues such as acceptance of electronic information, absence of information management strategies/policies, copyright and Intellectual Property Rights (IPR) concerns, inadequate technical infrastructure, lack of awareness and understanding of the concepts and lack of funds (Justin, 2006).

In spite of the benefits accruable from Open Access publishing, there are many challenges be devilling it as a form of publishing. The issue of quality of publications emanating from this model constituted a vital challenge that seemed to be a discouraging factor. Dulle and Minishi-Majanja (2011) adduced low quality of open access to lack of peer review. This is usually perpetrated by unscrupulous publishers who capitalize on huge turnover to search the Internet for publishable research/articles and thus publish contents that were either poorly peer reviewed or not peer-reviewed at all by them. The publication and dissemination of either poor or non-peer reviewed articles may results into rejection or non-recognition of such articles and journals by promotions committees of universities. This situation could make research efforts of academics and researchers fruitless for attaining promotion. It could also discourage academics, researchers and others from publishing their research or creative works in such publishing outlets. This probably might be the reason why Open Access contents have not been broadly accepted by some academics and researchers (Dulle & Minishi-Majanja, 2011).

There are several challenges facing use of open access institutional repositories. Mammo and Ngulube (2015) identified that most common problems to OA initiative in Ethiopia are low Internet bandwidth, a lack of clear institutional and national policy on OA and funding. In

addition lack of a champion (preferably in the library), university policy environments, institutional capacities, technical capacities and funding were some of the factors that adversely affect the development of OA in Africa (Ubogu, 2009).

According to Barwick & Pickton (2006) the implications and potential barriers to success of OAIR are summarized below

- ✓ **Difficulties in Generating Content:** A successful IR depends on the willingness of authors to deposit their works voluntarily and there may be local barriers and hindrances to overcome the. There are acknowledged difficulties in generating content, especially at the beginning. Unless the value of an IR can be demonstrated quickly, the organizations long-term commitment to the project may began to wane.
- ✓ **Right to Management Issues: S**ometimes researchers are apprehensive about in infringing publishers copyright and lack of adequate awareness about their own intellectual property rights. They may be uncertain about making their work available online before it is published by a traditional publisher.
- ✓ **Working Culture Issues:** Contributing content to user- generated or "self-service" sites is time consuming and time is something which academics often lack. They may be willing to contribute content but reluctant to do it themselves. This calls for mediated deposits service for them.
- ✓ **Policy Issues:** Experiences suggest that an IR will only function to its capacity when a mandate is in place to populate it but clearly researchers can react negatively to any suggestion of compulsion.
- ✓ **Lack of Incentives:** In the absence of any incentive academics feel reluctant to provide even bibliographic details of their scholarly output especially when they know that incentives are available in other institutions.

2.3.5. Factor Affecting usage of OAIR

The success of Information system have something to do with how the service provided and maintained for their users and how they manage their user expectations. So understanding user expectations of the system and factors that influence them becomes key to the successful information system.

Dulle (2010) studied factors affecting the adoption of open access scholarly communication by researchers in Tanzania, using the unified theory of acceptance and use of technology (UTAUT) model. In addition to performance expectancy, effort expectancy, and social influence, (Dulle, 2010) found out that, attitude as a key determinants and predictors of Tanzanian researchers' behavioral intention to use open access scholarly communication. However, these studies focused on faculty members' self-archiving behavior in all open access forums.

Lowga and Questier (2014) identified major factors that enhance and/or inhibit adoption and use of open access in Tanzanian health sciences universities. The study developed model suitable for assessing open access adoption and usage in academic institutions based on the social exchange theory (SET), and the Unified Theory of Acceptance and Use of Technology (UTAUT). The study found that facilitating conditions, extrinsic benefits (professional recognition), behavioral intention and individual characteristics (professional rank, technical skills and number of publications) predicted actual usage of open access. Other factors related to contextual factors (attitude, and open access culture), and extrinsic benefits (academic reward, accessibility and preservation) determined behavioral intention to use open access. Fear to violate publisher's copyright policies and effort expectancy however de-motivated faculty to adopt open access, while copyright concerns inhibited faculty's actual usage of open access.

According to Pal Kaur & Aggrawal (2013), there are 10 factors contributing to IS success. Service quality, system quality, information quality, user satisfaction and system use (perceived usefulness) were used in this research as they are more relatable to university's information system usage. Another factor that are crucial to OAIR success includes the capability of the software platform on which the repository is hosted, Because of costs associated with purchase, maintenance and rigidity of proprietary software, most institutions have adopted open-source IR software (Xia & Opperman 2010). Another factor includes the type of content stored in OAIR i.e. post-prints, pre-prints, conference and workshop papers, and theses or dissertations, but differed significantly on the level of theses or dissertations. Moreover the Interoperability or the discoverability of repositories on the internet makes the countries research output visible to others internationally.

Another researcher (Shearer, 2003) identified critical success factors affecting the growth and use of IRs. Those factors include input activity (e.g. the number of documents deposited into an

IR), disciplines, activities, archiving policies, copyright policies, content types, staff support, quality control policies, software, and the use of the repository. It should be noted that there are other factors or characteristics such as organizational culture that might affect the growth of IRs and their use.

Park and Qin (2007) employed grounded theory to explore factors affecting the decisions of scholars in the social sciences and information-related field to publish and use articles in open-access journals. They identified seven factors, perceived journal reputation, perceived topical relevance, perceived availability, perceived career benefit, perceived cost, perceived content quality, and perceived ease of use, pertaining to the scholars' willingness to publish in open-access journals. The first three factors are common factors affecting scholars' willingness to publish and use open-access journals. The researchers concluded that perceived content quality was an essential factor that affected scholars' willingness to publish.

2.4. Theoretical Framework

Researchers have come across many different models proposed to analyses individuals' acceptance and use of new information technology products and services. These models have been evolved over the years and came as a result of persistent efforts of the models' validation and extension that took place during the period each was presented. These models have their own theoretical assumptions, constructs or attributes and limitations. These models are:-1) Diffusion of innovation Theory (DOIT) 2) Theory of Reasoned Action (TRA) 3) Theory of Planned Behavior (TPB), 4) Technology Acceptance Model (TAM) 5) Unified Theory of Acceptance and Use of Technology Model (UTUAT). The theories and models that have evolved for explaining adoption of technology are summarized in below

2.4.1. Innovations Diffusion theory (IDT)

Innovations Diffusion theory is one of the oldest social science theories which was developed by E.M. Rogers in 1962. Rogers defines diffusion as "the process in which an innovation is communicated thorough certain channels over time among the members of a social system". As expressed in the definition, innovation, communication channels, time, and social system are the four main elements in the diffusion of innovations. Rogers (2003) proposes characteristics of innovations that help to decrease uncertainty about the innovation and to explain the individuals'

different rates of adoption, namely relative advantage, compatibility, complexity, observability and trial ability. Rogers (2003) defines rate of adoption as "the relative speed with which an innovation is adopted by members of a social system." It is measured by the number of individuals who adopt the technology within a specific period, for example, per year.

Relative advantage as" the extent to which an innovation is perceived to be better than the idea it supersedes and this is measured in economic terms, social factors, convenience, and satisfaction". Compatibility refers to the extent to which the innovation is perceived to be consistent with the existing values, past experience and needs of potential adopters. Adoption of an innovation is slow if it is not compatible with the norms and values of a social system. Complexity is "the degree to which an innovation is perceived to be difficult to understand and use. Simple innovations are easily adopted compared to complicated ones which would require the adopters to acquire new skills and understanding. Trial ability is the degree to which an innovation can be experimented with. Individuals prefer to learn by doing so. A trial able innovation removes uncertainties in the individuals. Observability refers to the degree to which the results of the innovation are visible to others and results are demonstrable (tangible)". The easier it is, the higher the chances of adoption.

Rogers (2003) defines innovativeness as "the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a system." Innovation adoption occurs at different rates depending on adopters' inclination towards taking risk, level of education and communication influence. Therefore, five categories of adopters were identified, namely, innovators, early adopters, early majority, late majority, and laggards

2.4.2. Theory of Reasoned Action (TRA)

In the model proposed by Fishbein and Ajzen (1975) it was suggested that attitude toward a behavior is determined by the person's salient beliefs about the outcomes of performing a behavior and evaluations of the outcomes. Subjective norms refer to *"an individual's perception of other's opinion about his/her particular behavior, if he should perform a particular behavior or not"* and attitude towards action is defined as *a person's positive or negative attitude towards this performed behavior.* Thus, TRA is a useful model that can explain the actual behavior of an

individual. In 1985 Davis took the same model and extended it to the TAM and linked it to the user acceptance of an information system.

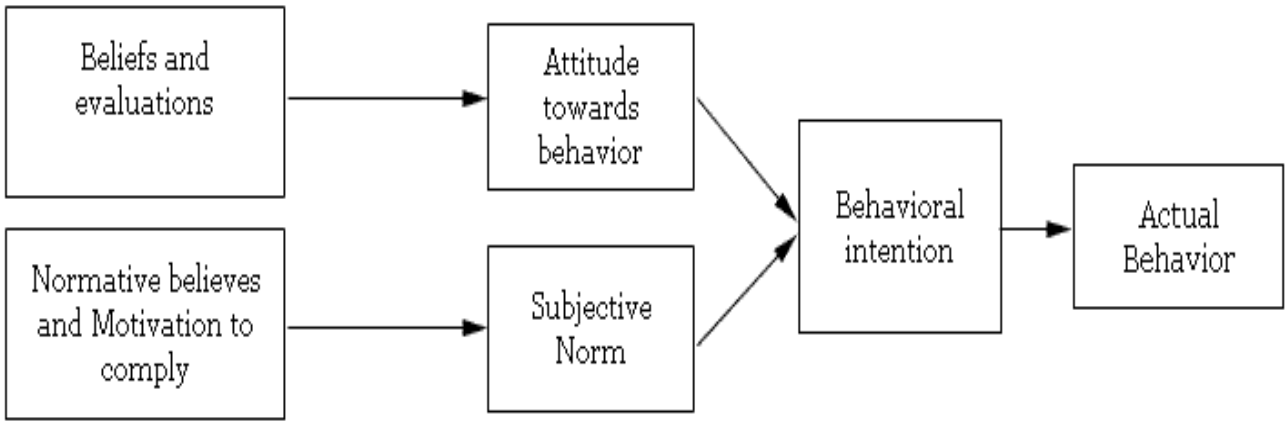


Figure 2.2 Theory of Reasoned Action (TRA)

2.4.3. Theory of Planned Behavior (TPB)

It is an extension of theory of reasoned action (TRA).The concept TPB was proposed by Icek Ajzen in 1985 to improve theory of reasoned action by including perceptions of internal and external constraints on behavior. It is concerned with the relationship between an individual's beliefs and "behavior in both voluntary and mandatory situations. Central to TPB, like in TRA, is that behavior intention determines an individual's performance of a behavior. TPB theorizes that behavior intention is determined by three independent factors, namely, attitude toward the behavior, subjective norms, and perceived behavior control. Ajzen extended the TRA by adding the construct of perceived behavior control. Attitude toward the behavior refers to the degree to which an individual has a positive or negative evaluation or appraisal of the behavior to be performed.

2.4.4. Technology Acceptance Model (TAM)

The technology acceptance model (TAM) is an information systems theory that predicts use and acceptance of information system by end users. It was developed based on theory of reasoned action model. According to Davis (1989) attitude of the user towards the acceptance of new technology or information system is determined by two primary factors: perceived usefulness and perceived ease of use. Perceived usefulness (PU) defined as "The degree to which an individual believes that using the particular system would enhance his or her performance" and

Perceived ease of use (PEOU) is defined as “the degree to which a person believes that using a particular system would be free of effort”. According to TAM model, Perceived ease of use and perceived usefulness are the most important determinants of actual system use. These two factors are influenced by external factors like social factors, cultural factors, and political factors.

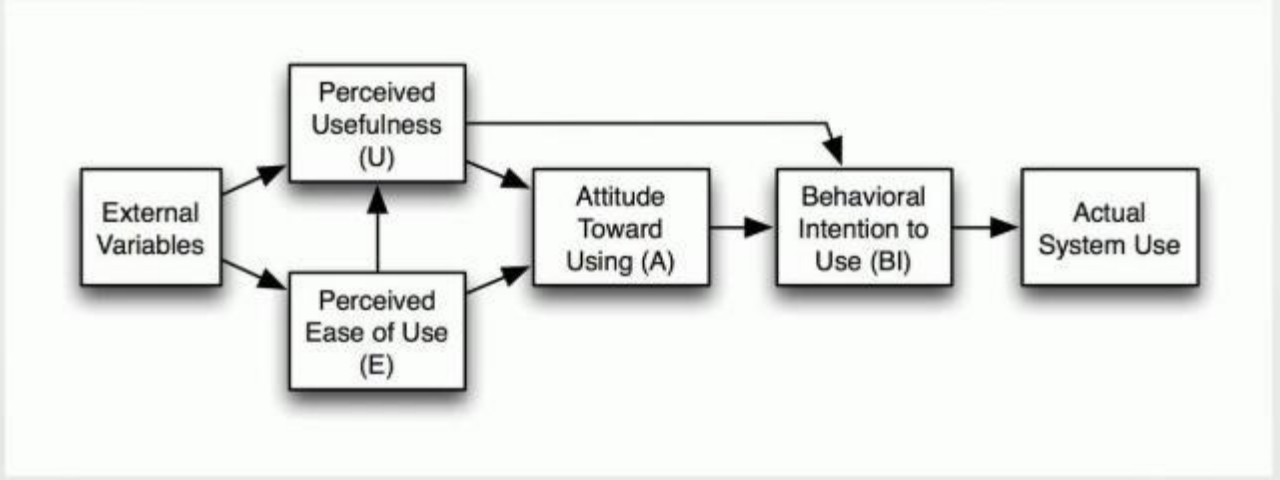


Figure 2.3 Technology Acceptance “Model by Davis version 1(1989)

Due to the limitations of the original TAM model TAM2 proposed the extended technology acceptance model called TAM2. TAM2 is an extension of the original TAM model first introduced in management science in order to propose the extended technology acceptance model called TAM2. TAM2 is an extension of the original TAM model first introduced in management science in order to explain perceived usefulness and usage intentions in terms of social influence and cognitive instrumental processes.

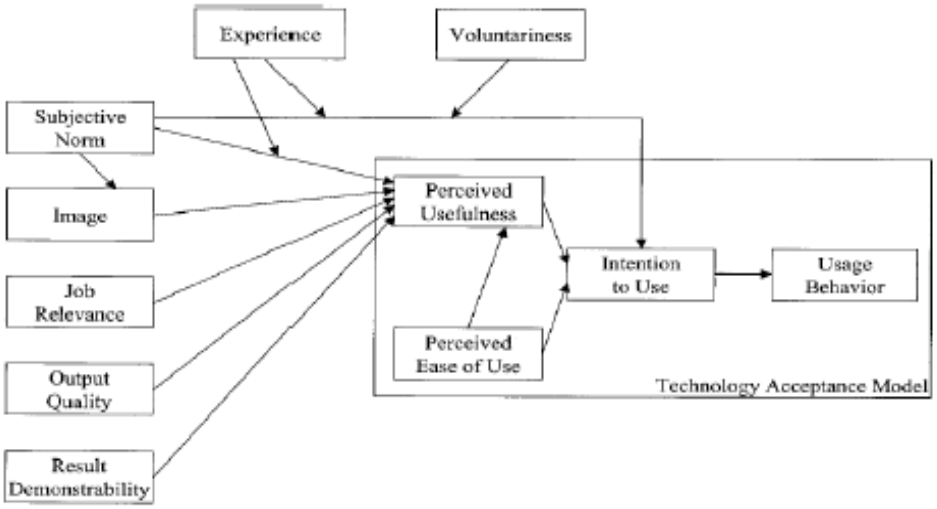


Figure 2.4 TAM2 Source Venkatesh and Davis (2000:188)

2.4.5. Unified theory of Acceptance and Use of Technology (UTAUT)

Unified Theory of Acceptance and Use of Technology **(UTAUT)** model is another theoretical model proposed developed by integrating different constructs from different theories to investigate user attitudes and preferences (Venkatesh & Davis, 2003).The UTAUT includes four core determinants or predictors of intention and usage, and up to four moderators of key relationships. Four constructs, 1) performance expectancy 2) effort expectancy3) social influence and 4) facilitating conditions, and the four moderators variables 1) Gender, 2) Age, 3) Experience, and 4) Voluntariness of use (Venkatesh & Davis, 2003).

The UTAUT is a combination eight behavioral models of technology adoption: these models are Theory of reasoned action (TRA); Technology Acceptance Model (TAM); the motivational model (MM); Theory of planned behavior (TPB); TAM&TPB, the model of PC utilization (MPU); Innovation diffusion theory, and the Social cognitive theory (SCT).

The UTAUT model has been applied in several studies investigating the general acceptance and usage of information and communication technologies(ICTs) and suggest support for the application of the UTAUT model in studying the adoption of open access in a research environment (Dulle & Minishi-Majanja, 2011). Dulle & Minishi-Majanja (2011) study on the acceptance and usage of open access in Tanzania's public universities established that effort expectancy, attitude, awareness and performance expectancy were key determinants of intention to use open access. They also found that social influence, awareness, age, behavioral intention and facilitating conditions significantly influenced researcher's actual usage of open access.

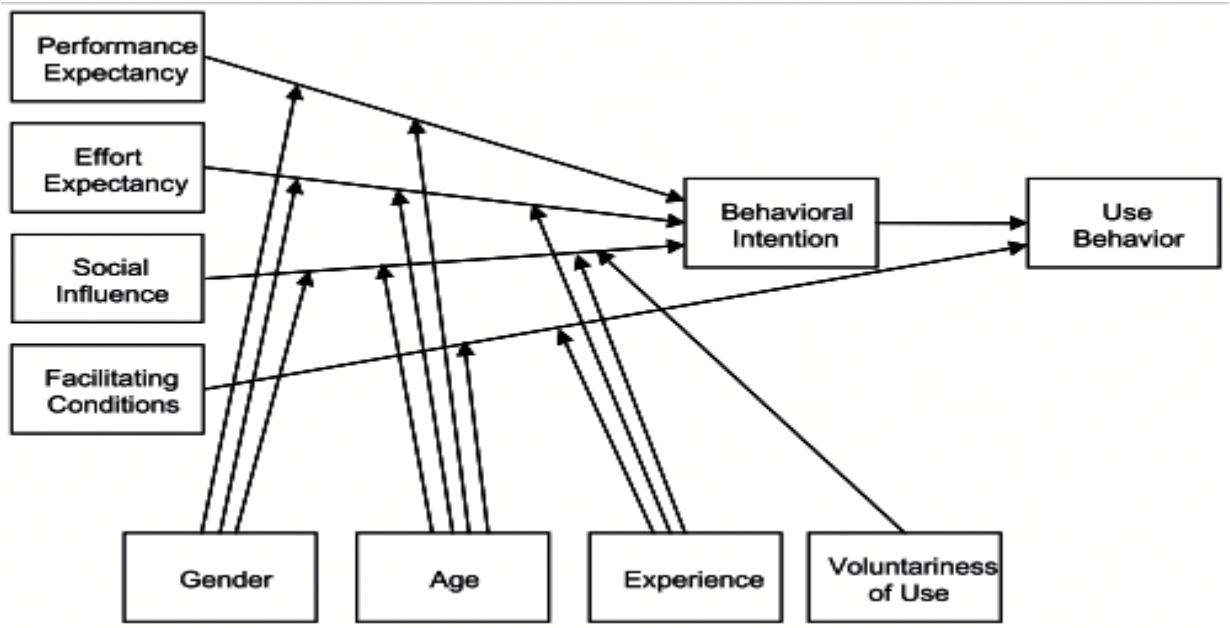


Figure 2.5 UTAUT model

2.4.6. The DeLone and McLean IS Success Model

In the year 1992, DeLone and McLean broadly review the information system literature on IS success that published between 1981 and 1987 in seven leading IS journals to develop the constructs of information system success (Petter & Mclean, 2009). The original DeLone and McLean Information system success model (D&M ISS model) shown in (Figure 2.2) was formulated to identify the factors for defining information system success. This model includes six distinct dimensions or factors of IS success as "System quality" which measures technical success; "Information quality" which measures semantic success; "Use", "User satisfaction" ,"Individual impact" and "Organization impact " measures effectiveness success (DeLone & McLean, 1992). This model shows that system quality and information quality directly influence user satisfaction and system use of information system. System use and user satisfaction influence each other and they both have an influence on individual impact which in turn influences organizational impact. But, this model did not specify how system use and user satisfaction are causally related and it only shows that system use and user satisfaction influence each other and are influenced by information and system quality. DeLone and McLean do not offer a study to validate the model; instead, they strongly appeal to IS researchers to utilize and test it in their studies to validate and further develop the model. Their request has been accepted and appropriated.

In 2003 DeLone & McLean looked back their original model on how the model was applied by information system researchers over the last decade and then refined their original framework (See Figure 2.2) by adding service quality dimensions as an antecedent of user satisfaction and intention to use.

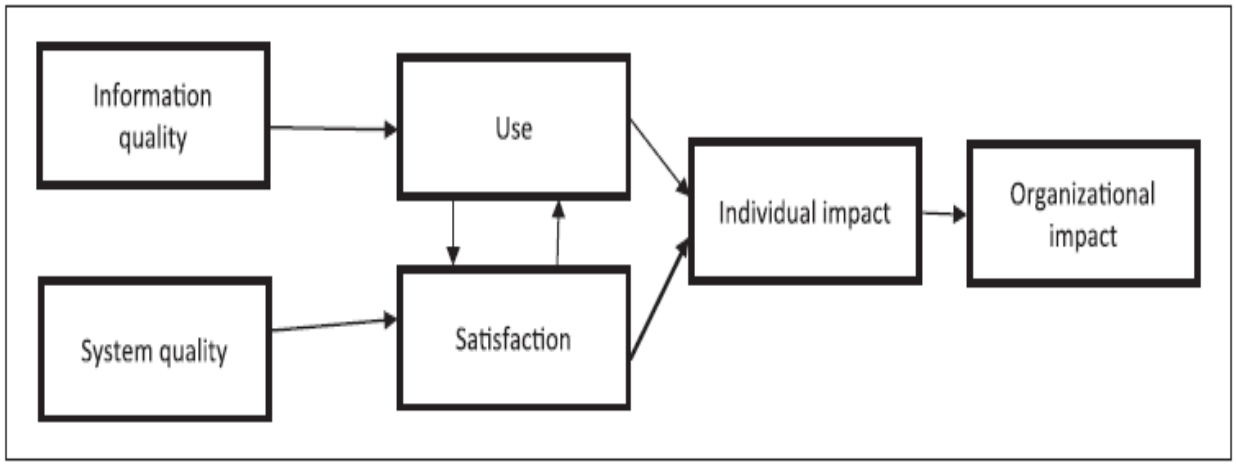


Figure 2.6. The Original IS success model (Delone and McLean, 1992)

The updated DeLone and McLean model defines the information system success based on the system quality, information quality, service quality, intention to use/use, user satisfaction, and net benefits dimensions. They explained the "use construct" and distinguished between two of its aspects: "intention to use" and "actual use". Intention to use is provided as an alternative measurable dimension for use, viewing intention to use as an attitude and use as a behavior. Use and user satisfaction are also interrelated, as use must precede user satisfaction in a process sense, the information system is used in order for user satisfaction to be occurred. Positive experience with use leads to greater user satisfaction which causes a causal link between use and user satisfaction. Individual and organizational impacts are also combined into one variable named "net benefit" and Net benefit has a positive impact on intention to use. They hypothesized net benefit and actual use as antecedents to user satisfaction (Delone & McLean, 2003).

The Updated DeLone and McLean's (2003) IS success model consists of six dimensions of IS success: system quality, information quality, service quality, actual use, intention use, user satisfaction and net benefit. This model is considered relevant for exploring the usage and satisfaction of Open access institutional repositories as an evaluation framework.

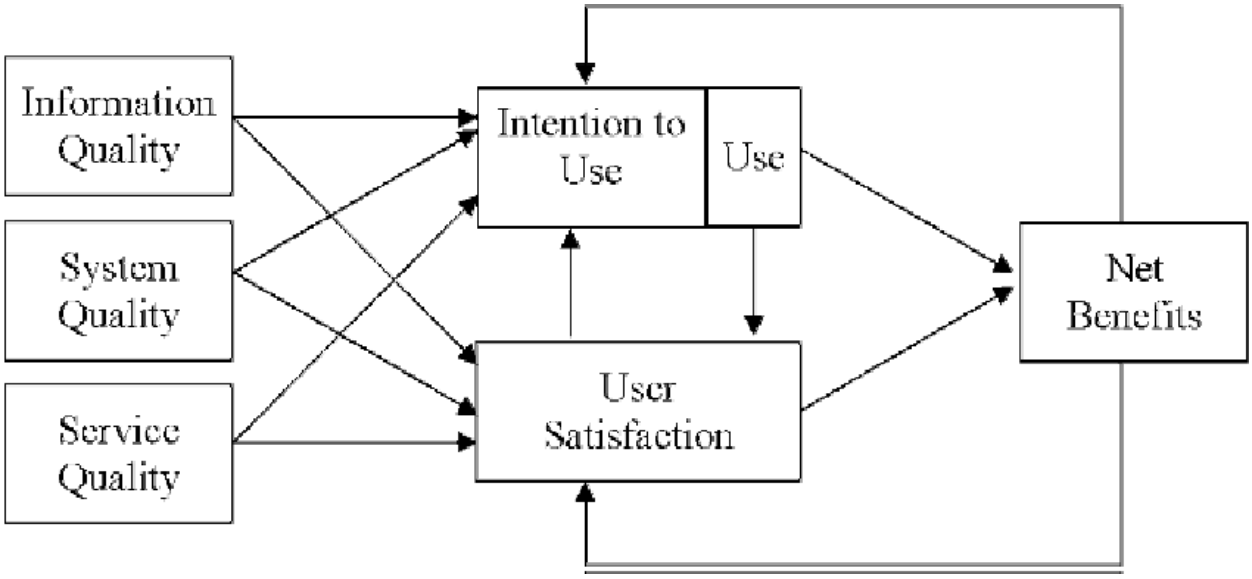


Figure 2.7.Updated Delone and McLean IS success model (Delone & McLean, 2003)

The D&M ISS model in its predefined form has been used by authors for constructing their research model and others extended the model by adding new constructs to fully capture the specifics of the type of IS under study. Several articles have been published that use the original and updated version of Delone &McLean IS Success Model as the theoretical basis and as a frame work to meet the requirements set by different Information system from different point of view. Later in 2004 Delone & McLean applied their model to evaluate the success of e-commerce systems. Then Lin (2007) also modified the 2003 model to assess the use of online learning systems. Further, Wang et al. (2008) used the model to assess the efficiency and success of e-learning information systems from the viewpoint of organizations and their employees.

Further Delone and McLean's model has been used widely to test several technologies in different study areas, including campus portal (Masrek etal, 2010 and Shaltoni, 2015). In addition, the model also helps to build the foundation for other theories, such as the Knowledge Management System (Wu & Wang, 2006) and the Enterprise System Success Measurement Model (Sedera, 2004).

In our country Ethiopia Delone and McLean's model also used in different context to test information systems in different areas. For instance Tesfu (2018) employed the DeLone and McLean model to predict user satisfaction with ERP system usage. He introduced and added new

constructs, “a social capital and management support” that plays vital role in boosting user satisfaction with the ERP system usage. The results confirm that system quality, technical support, management support and social capital as significant antecedents that enhanced the user satisfaction. A research by (Kalb, 2011), identified antecedents of end user’s satisfaction with ERP system implementation. In this research descriptive-exploratory survey strategy followed to investigate the contemporary phenomenon of the firm and information system theory is applied for the end-user satisfaction evaluation. The result of Kalb (2011) confirmed that it needs a detail emphasis on the service factors (dependability and support) and knowledge quality factors (user training level and system understanding) components. Thus, directs to have a more precise assessment of end-user satisfaction. Another research on the title “Developing a theoretical model and questionnaire survey instrument to measure the success of electronic health records in residential aged care” by (Yu P, 2018) used DeLone and McLean information systems success model by incorporating two variables training and self-efficacy in to the model. Yakubu & Dasuki (2018) used modified D&M ISS model to determine the success factor responsible for the acceptance an e-learning system called Canvas by students of Nigerian University. The findings partially supported the influence of the quality antecedents on behavioral intention and user satisfaction of students. There was full support for the relationship between behavioral intention and user satisfaction of students on their actual usage of Canvas.

Zaied (2012) proposes an integrated success model for evaluating IS success in public sectors by combining constructs from TAM and D&M updated model, ten dimensions were proposed for measuring information system success. The results indicated that information quality has a strong significant influence on IS success (81.9%) followed by Behavioral intention (80.2%); Perceived usefulness (78.8%); whereas the least one is user involvement (70%). The overall results show that the proposed model was beneficial for decision makers in organizations to evaluate the implementation of information systems.

2.5. Comparison Between the Models

There are different researches that has been done on adoption of the technology but a lot to be done towards actual usage of system by user. There are also different models that helps to evaluate user satisfaction system by user. Every IS success models have their own measurement criteria. So selecting appropriate IS success models that fits a specific context is important.

The TAM model, developed by Davis (1989) is used to measure the acceptance, adoption, and use of information technology. TAM model indicates the relationship between external variables, perceived usefulness, perceived ease of use, attitude toward use and actual usage. A TAM model provides information on how the design choices influence user acceptance of technology. Also TAM model has increased its applicability and applied in various studies by different researchers and it's one of the most known influential models. Even though the acceptance of information system is a necessary precondition for system usage, but it does not measure success instead it is used to study and predict the user's intention to use information technology. UTAUT model focuses more on factors external to the system. The overall aim of this model is on user acceptance of the system based on their expectations of the overall productivity, community influence and knowledge. Thus makes difficult to measure factors internal to the system that affect user satisfaction of actual system usage. On the other hand DeLone and McLean IS success model focus is on the impact of inner system qualities like responsiveness, attractiveness, information relevance reliability, flexibility and accuracy.

Hence, DeLone and McLean IS success model is selected as theoretical framework for this study to investigate actual usage OAIR by postgraduate students. The reason for primarily selecting DeLone and McLean IS success model to this particular study is that it is widely accepted and the most popular model of IS success measurement.

2.6. Review of Related Literature

A study by (Esther & Sally, 2012) has carried out an investigation of the current status of institutional repositories in state universities in Zimbabwe. This study revealed that the current state of repositories has largely been influenced by the political and economic situation in the country. This issue in Zimbabwe requires much attention from government and from the universities. Another study by (Mammo & Ngulube, 2015) has investigated the academics' use

and attitude towards open access in selected higher learning institutions in Ethiopia. This study revealed that majority of the academics were aware of open access journals and more than half of users agreed that open access journals had adequate standards of quality and scientific merit. They expect the university librarians to increase awareness and accessibility of open access journals among users through promotion and training and make academics aware of the benefits of publishing in OA journals and archiving their intellectual products. But this study did not investigate about usage of open access institutional repository and did not include postgraduate students.

Another study by (Prince & Saravanan, 2015) has conducted a study on awareness towards open access resources among the users in the higher educational institutions in Kanyakumari district. The study revealed that the majority of the users in higher educational institutions were fully aware about open access resources. The study also highlights that majority of the users in higher education institutions were satisfied with open access resources and its uses in their academic activities to fulfill their information need. Similar study by (Prince, 2015) has conducted a survey on user awareness and usage of open access resources by the academic community in the higher education system in Kanyakumari district. The studies revealed that majority (66.1%) of the users in the higher education system have experience in using electronic resources for more than two years. Majority of the users (59.4 per cent) use open access resources for the purpose of studying course material. Majority of the respondents have medium level awareness towards open access journals.

Ajoye (2014) researched on "Information systems user satisfaction: a survey of the postgraduate school portal, university of ibadan, Nigeria": They investigate how information system IS measures (such as system quality, information quality, service quality, technological/infrastructural issues, users' IT self-efficacy) influence user satisfaction of the university of Ibadan postgraduate school portal using a conceptual model adapted from Delone and McLean (2003): A descriptive survey was employed as the research design in the study. Self-structured questionnaires based on the adapted model were administered as data collection instrument. A sample size of 385 students was drawn and same copies of questionnaire were distributed proportionally to postgraduate students across the 19 faculties of the postgraduate school. The data was analyzed using descriptive and inferential statistics. The result shows that system quality, information quality, service quality and infrastructural issues were significant

predictors of users satisfaction, however, none of the IS measures predicted favorable on users' IT self-efficacy.

Another study by Yu-Hui (2011) conducted a research on undergraduate's perceptions and use of the university libraries web portal. Data were collected through two rounds of survey over a period of an academic semester. Results showed that the information literacy course positively influenced participants' perceptions of the libraries web portal in terms of perceived ease of use, information quality, system quality, and user satisfaction. Yet, the course did not have an impact on their perceptions of service quality. In addition, statistically significant differences were not found in the overall frequency and duration of use, but in other dimensions of use, namely purpose and task.

Lee and Kim (2010) study aimed to analyze the student user's satisfaction of campus-wide information systems in Korean universities. The study tested a modified model developed based on previous literatures to measure student user satisfaction of the information systems. The results of this study showed that information and system satisfaction significantly affected the overall user satisfaction with campus-wide information systems.

According to similar study conducted by (Veena, 2016) focused on awareness and use of open access information resources by University students: The purpose of the study was to investigate the awareness and utilization of open access electronic information resources and related issues among post graduate students at university of Mangalore. The study revealed that majority of students are aware of open access e-resources and 47.36% of them frequently used e-books/ e-journals. The study also highlighted that 38.15% of respondents acquired their open access e-resource usage skill through teachers/research supervisors and 64.47% of the students are satisfied with open access e-resources. Another study on Awareness and attitudes of faculty members towards developing institutional repository in Federal University, Kashere Gombe State Nigeria by (Temboge, 2018) revealed that faculty members were aware of the institutional repository but majority of them were not deposited their scholarly resources in the institutional repository and similar result by (Yang & Li, 2015) that the majority of responding TAMU faculty are aware of open access journals in their fields, and indicated their willingness to publish in an open access publication.

Wuraola, Sowemimo, & Rahmon, (2017) conducted a study on awareness and usage of open access among university lecturers in Nigeria. The study revealed that awareness of the lecturers about Open Access as a means of conducting research, updating general knowledge, updating/seeking knowledge in respective disciplines and forming lectures notes for students was high but low as a means of communicating research findings. It was further found that lecturers' awareness about Open Access impacted on usage of the information content.

"A study on use of Open Access Resources by the Engineering Students in Punjab (India)" revealed that students were familiar with open access sources (Harmanpreet & Harpet, 2017). Even though students' attitudes towards open access resource is varied, most of them agreed that open access resources are of high quality and that open access would benefit them. But his research cannot be generalized in our country context because of the cultural difference.

Similarly a study by (Renu & Bhanu, 2018) revealed that the majority of the users in TIMT, Yamuna Nagar, Haryana, have awareness and uses open access resources to fulfill their information needs and some of the respondents were not using open access resources due to lack of awareness and skills to use computer and Internet. Another study on social science scholars awareness towards open access and institutional repositories by (Chamani, 2017) revealed that majority of the academic staffs were not familiar with the term of open access. The study further revealed that most of the respondents learnt about the institutional repositories as a result of a web search engine, information provided at the faculty or meetings held in the university and by working in subject based archives. The study further reveled that scholar's willingness to contribute to the university digital repository in future.

Author, Title & Year	Objective/Purpose	Approaches/Methodology	Construct used	Key finding	Recommendation& future work
Lwoga 2013 Measuring the success of library 2.0 technologies in the African context: the suitability of the DeLone and McLean's model	To examine the suitability of IS success model in the adoption of library 2.0 technologies among undergraduate students in the African context,	Structural equation modeling (SEM) approach. A case study research design was used. Self-administered questionnaire were used to collect data.	service quality, information quality, system quality, user perceived net benefits, user satisfaction, intention to reuse	The result confirmed the validity of using the proposed IS model for library 2.0 adoption assessment. The user's intention to reuse accurately predicts the usage behavior and perceived net benefits had the strongest effect on users of library 2.0 services. Among the three quality antecedents, service quality had the strongest total effect on perceived net benefits and intention to reuse.	This study recommend to mix both qualitative and quantitative design with in-depth interviews with students and faculty and observations in a natural usage setting.
Ajoye 2014 Information system user satisfaction: A survey of the postgraduate school portal, university of Ibadan, Nigeria	To investigate how information system measures such as system quality, information quality, service quality, technological/infrastructural issues, users' IT Self-efficacy influence user satisfaction of the university of Ibadan postgraduate school web portal.	Survey research design Proportional stratified sampling	System quality, information quality, service quality, technological/infrastructural issues, users' IT self-efficacy, user satisfaction	The result shows that system quality, information quality, service quality and infrastructural issues were significant predictors of users satisfaction, however, none of the IS measures predicted favorable on users' IT self-efficacy.	The study recommend further study should focus on using other information systems model to measure user satisfaction.
Alzahrani et al, 2019 Modelling digital library success using the DeLone and McLean information system success model	To validate Delone and McLean's IS success model to investigate the factors that affect the actual usage of online libraries in Malaysia.	Quantitative research design structured questionnaire as primary data source	Information quality, system quality, service quality users satisfaction ,behavior Intention to use.	The findings showed that the quality factors of digital library systems have a strong influence on satisfaction, behavioral intention, and variance in actual use.	The study recommended further study to measure the effect of negative stimuli, such as resistance to change, on users satisfaction, & behavioral intention to use a digital library system. Further longitudinal research recommended to understand the results of quality factors might be altered when students' experience of using the library system increases.

Yakubu & Dasuki 2018 Assessing E-learning Systems Success In Nigeria: An Application Of The Delone And Mclean IS Success Model	To determine the success factors responsible for the acceptance of an e-learning system called Canvas by students of a Nigerian University	Quantitative method Online survey to collect data AMOS 22 using Structural equation modeling to test the relationship between constructs	Information quality, system quality, service quality, user satisfaction behavioral intention to use, Actual usage	The result partially support the effect of quality antecedents on behavioral intention and user satisfaction of students and there was full support for the relationship between behavioral intention and user satisfaction of students on their actual usage of Canvas.	Researchers interested in assessing e-learning could include public universities & moderators to propose generally applicable model.

Table 2.1. Review of related literature

2.6. Chapter Summery

The review of related literature shows that there are more issues to be covered considered in order to get more on information quality and service quality of the instutional instituional repositary. This study used the survey to address the outlined research questions. Therefore, DeLone and McLean IS success model is an appropriate model to assess the user satisfaction based on the constructs or dimensions featured in the model and extended the model to develop conceptual model for this research.

Chapter Three
Research Methodology

3.1. Introduction

This chapter discusses the research methodology that has been adopted to investigate the level usage and satisfaction of postgraduate students towards open access institutional repositories at Addis Ababa University. A conceptual model based on the updated DeLone and McLean (2003) IS Success model and relevant prior studies were designed to investigate the level usage and satisfaction of postgraduate students. This chapter provides a detailed description of the research design and methodology. This is followed by explanation of sampling design, data collection procedure and analysis. Finally, the research validity and reliability procedures have been discussed as well.

3.2. Research Methodology

In most of the studies the selection on research methodology is based on the research problem and stated research questions. The term 'research methods' refers to the techniques and procedures used in collecting data while 'methodology' aims to describe the strategies surrounding the use of various methods of collecting data which is reliable and valid (Cohen etal, 2007). A research methodology does not only include the research methods used but also considers the logic behind the choice of the methods in the context of the study, explaining why a particular technique or method has been used over others to enable evaluation of the research results by others (Kothari, 2004).

In one way or another research methodologies are the overall approach which underpin the research process (Kothari, 2004). In general, the research methodology is the significant part of a research, because it helps researchers to decide how to achieve the specified objective, what data to collect, how to collect and analyze the data in order to solve the problem identified and it needs much attention on selecting the appropriate methods which can provide the desired outputs of the research objective. Therefore, the aim of this section is to explain the processes and procedures followed in collecting data for the study.

3.3. Research Context

Addis Ababa University (AAU) is a public university which was established in 1950 as the University College of Addis Ababa (UCAA). AAU is the leading, the oldest and the largest higher learning and research institution in Ethiopia. Currently, AAU has 10 colleges, 4 institutes that run both teaching and research, and 6 research institutes that predominantly conduct research. Within these academic units, there are 55 departments, 12 centers, 12 schools, and 2 teaching hospitals (AAU, 2019).

In the present information explosion era, academic libraries play a pivotal role in preserving and serving the information requirements of the users. In the present scenario, libraries are the main facilitators in the scholarly communication system. The information to be communicated has been selected, acquired, processed, stored and retrieved by the library for current use and for prosperity. Therefore, the library is a place where books and other source of information kept for teaching, learning, research and publication.

Every University has an important organ called a library and this organ is the heart of every higher education. Addis Ababa University libraries play an important role in supporting, facilitating and improving the teaching and learning process which leads towards achieving the mission of university. A library has different collections starting from hard copy to e-resources. The available e-resources used by students and researcher include digital library services or databases, subscribed journals, open access institutional repositories, ETD's and directory of open access journals.

The open access institutional repositories found in AAU libraries are listed below:

3.3.1. Addis Ababa University Institutional Repository (AAU-IR)

AAU-IR is a digital service that collects, preserves, and distributes digital material (AAU, 2019). The Repository is important tool for preserving the AAU's legacy. It facilitates digital preservation and scholarly communication that is open and freely accessible to all students and researchers (AAU, 2019).

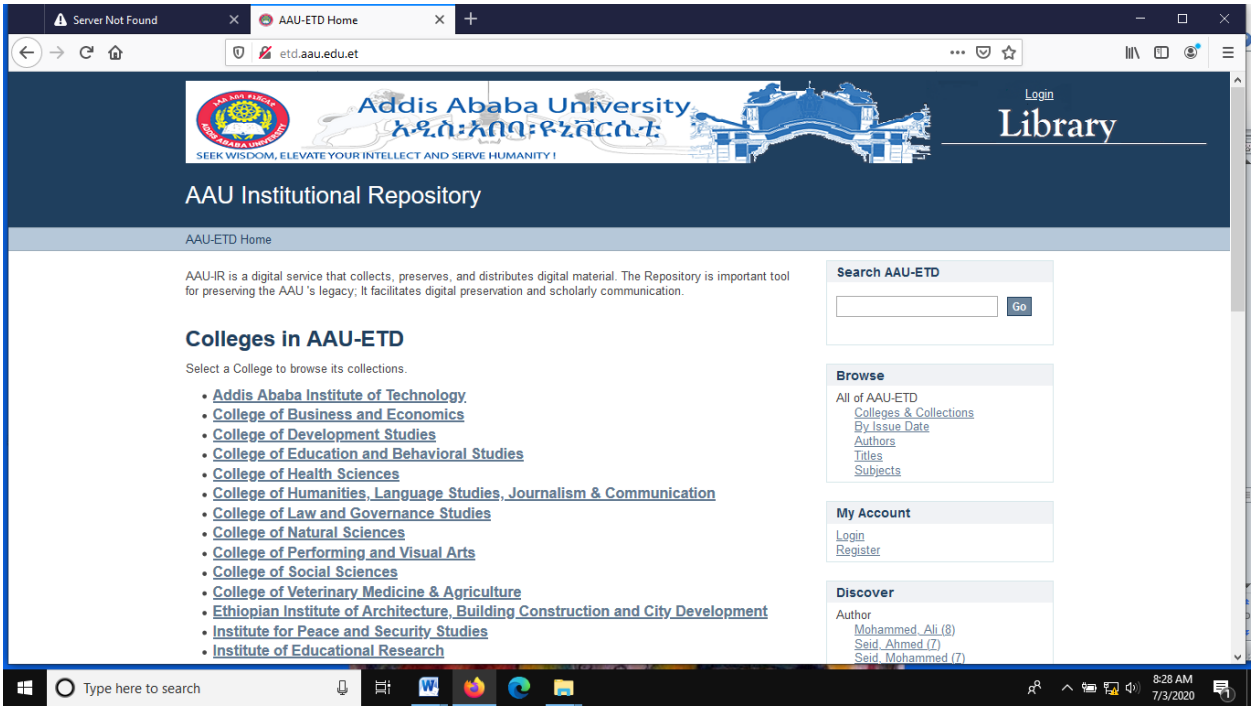


Figure 3.1 shows the main interface of AAU-IR

3.3.2. Ethiopian Journals online (EJOL)

EJOL was initiated as a project by Addis Ababa University libraries in collaboration with Electronic Information Libraries and Office of Vice President for Research and Technology Transfer of Addis Ababa University (AAU) in 2013. The objective of the project was to provide a platform to publish local journals online using Open Journals System (OJS) to give greater visibility to the participating journals through open access (OA). The project was successfully completed and launched in 2014 with participation of six OA Journals from AAU and St. Mary University. The EJOL platform is freely available to all open access journals which are locally published in Ethiopia (AAU, 2019). Currently EJOL hosts 27 open access Journal and 1066 full text articles to be downloaded.

Figure 3.2. Shows home page of Ethiopian journals online

3.3.3. DOAJ: Directory of Open Access Journals

Database of open access journals cover all scientific and scholarly subjects. Primarily DOAJ is used to identify open access journal titles and forty percent of them are searchable at the article level. Journals can be browsed by title or by broad subject area. Articles are searchable by article author or title, ISSN, journal title, abstract, or key words. Full-texts of a paper are not searchable but could be fully accessible. To be included in the DOAJ, journals must use a funding model that does not charge readers or their institutions for access and must exercise peer-review or editorial quality control.

3.3.4. Subscribed Journals

There are around 63 subscribed journals that are freely and openly accessible electronic resources. The full list of subscribed journals and corresponding number of freely available sample articles are shown in Appendix 4.

Hence in this study an attempted has been made towards the usage and user satisfaction of open access institutional repositories by postgraduate students at AAU.

3.4. Theoretical Framework of the Research

An intensive literature review was used to identify the theoretical model applied for this study. There are different IS success models that helps to evaluate user satisfaction of actual system usage. These models have their own measurement criteria. So, selecting appropriate IS success models that fits this research context is important. In this study, on the other hand, the researcher wants to examine user satisfaction on OAIR system usage from user perspective. According to DeLone and McLean (2003), measuring the success of information systems is very important if their value and contribution to the usage of the system by user and towards achieving their need. Finally, the DeLone and McLean model is widely accepted, the most cited and comprehensive model for evaluating IS effectiveness. So, DeLone and McLean model is selected as theoretical foundation for this study. The researcher of this study has made modification by adding other variable from the study of Compeau & Higgins (1995) which focused on variable called self-Efficacy to fit the context of information systems under study. Further, the study was based on a modified version of the updated D&M ISS model similar to the models applied by Alzahrani etal, (2019) and Yakubu & Dasuki (2018) which were used to measure the success and usage of information system.

The conceptual research model shown in (Figure 3.3.) is used to explore the level of usage and satisfaction of OAIR system by postgraduate students of Addis Ababa University. Information quality, system quality, and service quality derived from the updated D&M ISS model and Self-Efficacy which is derived from the study of Compeau & Higgins (1995) was used to explain the effects they have on the actual usage of the system through user satisfaction and behavioral intention.

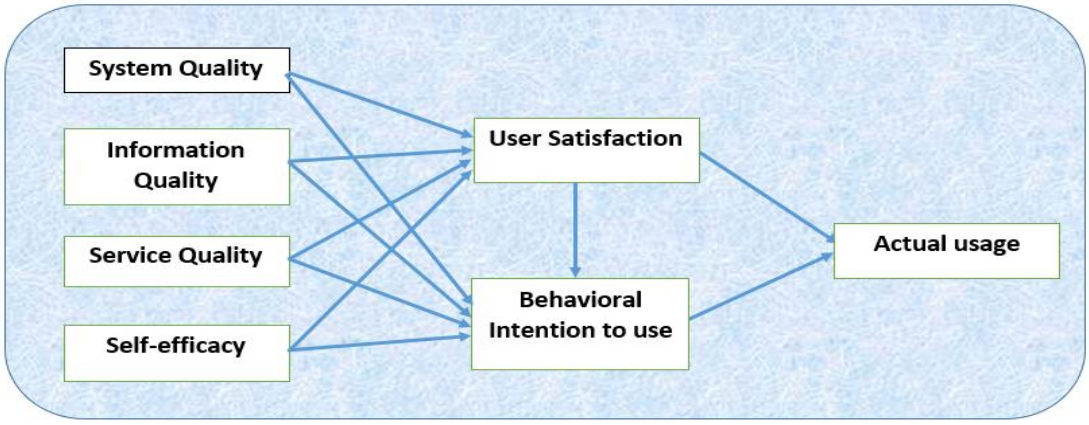


Figure 3.3. Conceptual research model

Based upon the proposed model the following hypotheses have been formulated:

3.4.1. System Quality (SQ)

SQ was taken as a measure of technical success that describes the OAIR system from a technical perspective. Delone & McLean (2003) explained that system quality as an important construct to describe the desired characteristics of an ICT system. The system quality measures the following aspects: ease of use, system flexibility, reliability, consistency, response times and availability (Jaafreh , 2017). The result obtained from meta-analysis of nine published researches by Petter and McLean (2009) has revealed that SQ had a significant and strong impact on the US and BI. Based on the above-mentioned discussion, one can assume that the higher the SQ of the OAIR system, the more probable that students will have higher intention to use the system and will be satisfied. Further previous studies have shown that SQ has an influence on user satisfactions (Mohammadi, 2015; Urbach & Müller, 2012; Wu & Wang, 2006) and behavioral intention to use (Lwoga, 2013; Alzahrani etal, 2019) .Therefore, the following hypotheses have been proposed

H1: System Quality increases user satisfaction of the open access institutional repository;

H2: System Quality increases behavioral intention to use the open access institutional repository system;

3.4.2. Information Quality (IQ)

Information quality is the output of an information system, which could be measured by the quality of the information content, accuracy and the format of the information generated from OAIR system as evaluated by the postgraduate students. The quality of the information in the institutional repository is determined by whether it fits for the intended purpose or not. Further, the quality information must meet the expectations of post graduate students. The characteristics of the OAIR system outputs mainly expressed in terms of relevance, completeness, consistency, understandability, accuracy, relevance, conciseness and timeliness (DeLone & McLean, 2003).

Previous studies have shown that IQ has a positive influence on user satisfaction (Petter and McLean, 2009; Masrek et al, 2010; Urbach & Müller, 2012; Mohammadi, 2015 Alzahrani et al., 2019) and behavioral intention to use, (Lin, 2007; Lwoga, 2013; Shaltoni etal., 2015; Yakubu & Dasuki, 2018; Alzahrani et al., 2019). Thus, the quality of information will be determinant by

user satisfaction and their behavioral intentions to use the OAIR system. Therefore, considering the importance of information quality, the researcher made the following hypotheses:

H3: Information Quality increases user satisfaction of the open access institutional repository;

H4: Information Quality increases behavioral intention to use the open access institutional repository system;

3.4.3. Service Quality (ServQ)

Service quality is defined as the quality of support provided by the information system's developer or IT department to the users of the system. It could also be explained in terms of timely response, technical competence and empathy of the concerned IT personnel providing the support service. Service quality is added into the updated DeLone McLean model to indicate that IS is not only a product but also services (Delone & McLean, 2003).

Service quality has also been identified as a significant predictor of user satisfaction (Masrek et al., 2010; Urbach and Müller, 2012; Lwoga, 2013; Shaltoni etal, 2015; Yakubu & Dasuki, 2018) and behavioral intention to use (Mohammadi, 2015; Alzahrani etal., 2019). Therefore, it is assumed that higher level of service quality leads to higher level of user satisfaction and behavioral intention to use. Thus, the researcher made the following hypotheses:

H5: Service Quality increases user satisfaction of the open access institutional repository;

H6: Service Quality increases behavioral intention to use the open access institutional repository system;

3.4.4. Self-efficacy (SE)

Self-efficacy is conceptualized as one's belief in his or her own capacity to use an OAIR system (Venkatesh et al., 2003; Compeau & Higgins, 1995). Individuals with higher self-efficacy are more likely to use technology. This study conceptualized self-efficacy increases postgraduate students' behavioral intention to use OAIR and their satisfaction in using the system. This study proposes the following two hypothesis:

H7: Self-efficacy increases user satisfaction of the open access institutional repository;

H8: Self-efficacy increases behavioral intention to use the open access institutional repository system;

3.4.5. User Satisfaction (US)

User satisfaction constitutes the user's level of satisfaction when utilizing an information system. According to Delone and McLean (1992) user satisfaction the most important means of catching the users' view concerning the use of information systems. It is considered as one of the most important measures of IS success. Further it can be described as the level of satisfaction with the use of the system as impacted by system quality, service quality, and information quality and self-efficacy of an information system. User satisfaction is usually measured in dimensions of competence, satisfaction, and usefulness. User satisfaction has been shown to have influence behavioral intention to use (Urbach & Müller ,2011; Lwoga, 2013; Mohammadi, 2015; Yakubu & Dasuki, 2018) and actual usage (Mohammadi, 2015; Alzahrani et al., 2019). Hence, the researcher has made the following hypotheses:

H9: User Satisfaction increases behavioral intention to use of the open access institutional repository;

H10: User Satisfaction increases actual use of the open access institutional repository system;

3.4.6. Behavioral Intention to use (BI)

Behavioral intention is described as how inclined the users are to actually utilize the information system. It is the likelihood of user to participate in a particular behavior. In the voluntary usage context DeLone (1988) has described intention to use as the total number of functions used, the frequency of use, and the time spent while using the system. Later, Davis (1989)has described the usage of the IT system towards subjective measure of intention to use by employing a questionnaire. Thus, in this study an attempt has been made to find out how much behavioral usage intentions are positively correlated with actual utilization. The majority of the research in the information technology arena posits behavioral intention as the most proximal antecedent of actual use (Alzahrani et al., 2019). Previous studies have found support for the relationship between Behavioral intention to use and actual usage of the systems includes (Lin, 2007;

Mohammadi, 2015; Yakubu & Dasuki, 2018; Alzahrani et al., 2019).Hence, the researcher hypothesized as follows:

H11: Behavioral intention to use OAIR system increases actual use of the open access institutional repository system;

3.4.7. Actual System Usage (AU)

System use can be defined as the extent to which users use the system effectively and efficiently to perform different tasks. This is measured in terms of frequency of use of the system, number of accesses, dependency, usage pattern, and time of use. According to DeLone and McLean (2003), use and intention to use are alternatives in their model, but intention to use may be worthwhile in the context of mandatory usage. Regarding to voluntary usage of the system, use might be taken as an actual behavior and use is preferred than that of intention to use as a success variable.

3.5. Research Design

"A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure" (Kothari, 2004). According to Bhattacherjee (2012), a research design is a 'blueprint' for empirical research whose aim is to answer particular research questions or test particular hypotheses, and therefore, should "specify at least three processes: the data collection process, the instrument development process, and the sampling process (Bhattacherjee, 2012). In the present study, mixed methods of research (MMR) design have been adopted.

Mixed methods research have recently gained popularity in social science research practices and have been recognized as the third major research approach/paradigm combining elements of quantitative and qualitative researches to answer complex questions (Tashakkori & Creswell, 2007; Onwuegbuzie, 2007). The mixed methods approach integrates different set of ideas and practices that distinguish it from the other major paradigms (Bhattacherjee, 2012).

On the other hand, Onwuegbuzie (2007) define MM as: Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data

collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration. Bazeley (2008) proffers that mixed methods often combine nomothetic and idiographic approaches in an attempt to serve the dual purposes of generalization and understanding to gain an overview of social regularities from a larger sample while understanding the other through detailed study of a smaller sample.

In this study, mixed methods have been utilized to gain a comprehensive view of the current level usage and satisfaction of postgraduate students towards open access institutional repository at Addis Ababa universities. In order to get a deeper understanding of the level of usage and satisfaction of the postgraduate students in using OAIRs, the population selected for the study have been broken down into sub-groups. The groups in the population include postgraduate students and IR system Administrators (IR librarian). Combining quantitative and qualitative research together collude lead to a better understanding of the research problem than either approach alone (Cresswell, 2009).

Overall, Actually, Qualitative and quantitative are not research methods. Both are means of analyzing the data collected. Quantitative data is information about quantities, and therefore numbers, and qualitative data is descriptive, and regards phenomenon which can be observed but not measured, data collection tools associated with this method includes observations, interviews and documents, and it employs interpretive data analysis through themes. On the other hand, quantitative research is primarily concerned with measurement issues and therefore, collects numeric data, metrics and so on to measure concepts and relationships between variables in order to derive meaning. Data collection tools associated with quantitative research approach includes questionnaires and structured interviews (Bhattacherjee, 2012).

Qualitative research emphasizes interpretation of data giving it more meaning so that it is understandable whereas the quantitative approach gives meaning to data by rearranging, scrutinizing and discussing the numerical data by using charts and statistics to explain the relationships between the patterns in the data and the research question. The emphasis of mixed method research is the use of multiple research methods (qualitative and quantitative approaches) in tandem and philosophical assumptions (Ngulube, 2012; Cresswell, 2009) that guide the collection and analysis of data in research and facilitates understanding of a phenomenon or problem. It was therefore hoped that the use of this method in the present study would assist in

understanding the issues around the satisfaction and usage of open access institutional repositories for scholarly communication at Addis Ababa University.

The motivation to use mixed methods in this study was "the belief that the quality of the study can be improved when the biases, limitations, and weaknesses of a method following an approach counterbalance each other" (Fidel, 2008). The weakness of quantitative research is that it does not understand the circumstances under which people talk and their voices are not directly audible while the researcher's interpretations and biases are excluded. This deficiency is countered by the qualitative research approach which relies on the researcher's individual interpretations and subsequent biases. In addition, it is difficult to generalize the results of a qualitative study due to the small number of respondents; this deficiency is compensated for by quantitative research (Cresswell, 2009). The other advantage of using mixed methods is that MMR exhibits more proof for studying a research problem than would quantitative or qualitative alone. The researcher has leeway to use various available data collection tools without being restricted to prescribed tools for qualitative or quantitative methods.

According to Kothari(2004), the quantitative research method involves gathering information and data which is evaluated through a statistical analysis. Quantitative research method gives clear presentation of finding and the result could be used for a larger population if it's well carried out. So to have a better understanding and detailed information about this research, quantitative approach was mainly used as it provides respondents to answer or explain their feelings and their opinions without being fear of their responses. Additionally qualitative approaches were also used. Mixed method research was used for the purposes of this study in assessing influencers of behavioral intentions amongst postgraduate students' and IR librarians of open access institutional repositories in at Addis Ababa University.

Therefore, this study used both quantitative and qualitative methods to increase the researchers' insights. In order to attain the objective of the study and answer the research questions; this research adopts both quantitative and qualitative (Mixed) research approach. The rationale of using such a mixed approach is to gather data that could not be obtained by adopting a single method and for triangulation (Cresswell, 2009).

3.6. Study Population and Sampling

Bhattacherjee (2012) defines a population as "all people or items (unit of analysis) with the characteristics that one wishes to study." Target population is the specific population about which information is desired. According to Lefuma (2017), a population is a well-defined set of people, services, elements, events, group of things or households that are being investigated and to which the findings will be generalized. The target population of the study is Postgraduate (both Masters and PhD) students of Addis Ababa University and IR librarian who are working on Addis Ababa University (AAU) Library. Addis Ababa University has more than ten campuses but for this study only two were selected, namely; Main Campus (MC) and Faculty of Business and Economics Campus (FBE).

Sampling can be used to make inferences about a population or to make generalizations concerning existing theory. A sample design is a definite plan for obtaining a sample from a given population. Therefore, to collect full information, the researcher purposely selects 2682 postgraduate students who have registered their email addresses from the two campus of AAU. The purposive convenience sampling was adopted, which is the most frequently used approach in qualitative studies (Kumar, 2005).Based on recommendations and discussions in qualitative research literature one respondent from Addis Ababa university library and five postgraduate students were selected to participate in this research.

The sampling technique used to select the campuses is purposive sampling. It is because of the restriction or problem of moving from place to place due to COVID-19 pandemic. These campuses are situated near by the researchers' residence at 6 kilo. Statistics (list of respondents) and email address of the total number of post graduate students and IR librarians were also obtained from the campus registrar and main library respectively by requesting with an official support letter written from School of Information Science.

For the qualitative study purposive sampling method was used, which helps the researcher to select the appropriate person for the interview. The key informants who believed to provide the required information were postgraduate students. So, five postgraduate students were participated in the interview. Additionally an IR librarian who is experienced expert from FBE library was selected and participated. For the quantitative study the researcher selects a total of 2,682 postgraduate students from the selected two campus that is main campus and FBE campus.

Of which 522 students were register their email correctly. The researcher selected these students and send the questionnaire via their email. The response for questionnaire dependent on respondents' willingness to participate in the survey. Additionally extended Internet connection down time due to nationwide problem and movement restriction due to COVID-19 pandemic the researcher was unable to invite more respondents to the survey.

3.7. Data collection instruments

This study used online questionnaire and interview to gather data. Connaway and Powell (2010) define survey research as "the research strategy where one collects data from all or part of a population to assess the relative incidence, distribution, and interrelations of naturally occurring variables." Through surveys, beliefs and attitudes of a study population can be examined and also a wide audience can be reached. The present study sought to aggregate the views of the stakeholders (Postgraduate students and IR librarians) about the scholarly communication in Addis Ababa University. A survey was carried out with the aid of online questionnaires for Postgraduate student; interviews involving postgraduate students and IR librarian, and document analysis to gather data on level of usage and satisfaction of the PG students towards use of open access institutional repositories in the university. The choice of this method was influenced by the fact that it permitted collection of data using multiple methods of data collection and multiple sampling strategies in relation to the mixed methods approach (Katsirikou & Skiadas, 2010). This survey was both exploratory and descriptive.

An exploratory survey is concerned with examining a new area of inquiry for the purposes of determining the magnitude of the problem, deriving new knowledge about the problem and generating questions for future research (Bhattacherjee, 2012). Through exploration, the researcher's familiarity with a phenomenon increases and concepts can be clarified. Therefore, a literature review was done (Chapter 2) to gain understanding of OAIR developments globally, regionally and in the country. On the other hand, a descriptive survey is concerned with conditions or relationships that exist; practices that prevail; beliefs, points of views, or attitudes that are held; processes that are going on; effects that are being felt; or trends that are developing. At times, descriptive research is concerned with how what is or what exists is related to some preceding event that has influenced or affected a present condition or event (Cohen etal, 2007).

This description is shared by Connaway and Powell (2010) who proffer that the purpose of surveys method is to describe the study population's traits, "estimate proportions in the population, make specific predictions, and test associational relationships." Therefore, a descriptive survey is concerned with presentation of a detailed impression of a given phenomenon by documenting the 'how' and 'who' aspects of a phenomenon (Bhattacherjee, 2012)by studying a representative sample population.

Due to the outbreak of COVID-19 pandemic, the interview for both selected Postgraduate students and IR librarians of the Addis Ababa University Libraries was conducted by phone. Data was collected using Google online survey form. A Google online survey was the preferred method of collecting data for this study especially during the outbreak of COVID-19 pandemics to avoid direct contact with respondents, in order to minimize errors that might be caused by data handling and reduce costs. Documentary analysis was done involving research and OAIR documents, review of existing literature analysis of the institutions' IRs.

This study capitalized on the inherent strengths of survey research. Firstly, surveys present an opportunity for measuring several unobservable data, such as individuals' attitudes towards open access and institutional repositories, their beliefs and preferences in scholarly communication practice, behaviors towards adoption of new technologies, or factual information about OA.

Secondly, the method enabled remote collection of data through electronic mail and telephone interviews. Because of the outbreak of COVID-19 pandemic, respondents could not be reachable at designated times. The researcher engaged in online survey to distribute and collect questionnaires. Thirdly, the inherent strengths of interviews is to further strengthen survey research. An analysis of the effects of Information quality, Service quality, System quality and Self-efficacy to determine the postgraduate students' intentions to satisfy and use of the OAIRs. Finally, in terms of time, effort, restriction of movement due to COVID-19 and cost, e-survey research is economical and efficient.

3.7.1. Questionnaires

As one of the categories of survey research, a questionnaire is described as a research instrument comprising "a set of questions (items) intended to capture responses from respondents in a standardized manner" (Bhattacherjee, 2012). Online Questionnaires are mailed to the

respondents with a request to return after completing. It is the most extensively used method in various economic and business surveys. Before applying this method, a Pilot Study for testing the questionnaire was conducted to correct any limitation in the questionnaire design. Questionnaires must be prepared very carefully so that it will be used as an effective tool to collect relevant information (Kothari, 2004).

Self-administered electronic questionnaires were used and they comprised both closed or structured questions and open-ended/unstructured questions. Closed-ended questions required respondents to select the most appropriate response(s) from a list of choices whereas open-ended questions provided respondents with an opportunity to provide answers in their own words and also give detailed explanations.

Questionnaires are formulated using the Google survey platform which is an economic means of collecting data. The electronic questionnaire distributed to all postgraduate students of two campus via email. The electronic questionnaire allowed respondents to provide responses to questions at their convenience without the influence of the researcher. Due to the outbreak of COVID-19 pandemic, electronic questionnaire was used as appropriate method to collect the data for this research.

The questionnaire was developed and distributed for postgraduate students (Appendix 1) also comprised three sections, namely, demographic data, awareness of open access and perceptions of IRs. Section A intended to collect demographic data with both open-ended and closed-ended questions, Section B question that sought to establish the respondents' challenge toward usage of OAIRs and Section C intended to measure the post graduate student's level of usage and satisfaction of the concept of open access institutional repositories and sought to establish the respondents' challenge toward usage of OAIRs. In this section items for assessing system quality, information quality, service quality, user satisfaction and intention to use were measured by item developed by (DeLone & McLean, 2003). The item used to measure the self-efficacy were adapted from (Compeau & Higgins, 1995). Items in this section are measured in five items Likert-type scale.

3.7.2. Interviews

Interviews are a more personalized form of collecting data (Bhattacherjee, 2012) which can be conducted either face-to-face or by telephone. According to Creswell (2009) interview is one of the qualitative data instruments with a purpose to gain insight into certain issues and opinions from the participants by making telephone and face-to-face communication with participants. This study used semi-structured interviews involving IR librarians to obtain in depth insight into the acceptance and use of OAIRs in the universities. The interview allowed the researcher to probe for more detail or ask follow-up questions to responses that were given by the respondent while the respondent was also afforded the opportunity to seek clarification on ambiguous questions. Therefore, an in-depth interview is a meaning-making partnership between interviewers and their respondent. This brings to the fore the fact that collaboration takes place between the interviewer and the respondent (Kothari, 2004).

Therefore, for this study the researcher (the interviewer) interacts with an IR Librarian (the interviewees) and five postgraduate students (the interviewees) by telephone to obtain an overview of the OAIRs system and also to establish how they intended to ensure maximum return on investment in established IRs. The interview guide for the IR Librarian **(**Appendix 2) and interview guide for the postgraduate students (Appendix 3). Based on the objectives of the research, the interview guide of the study was developed from different literatures and the research model used.

3.8. Data analysis tools and techniques

According to Kothari (2004), data analysis refers to measuring and finding the relationship among the data component. Content analysis in qualitative enquiries classifies textual material by reducing it to more relevant and manageable bits of data (Gorman & Clayton, 2005). According to (Kumar, 2005) content analysis is considered a detailed and systematic description of the content of communication to identify patterns or themes. For qualitative data, it was analyzed by sorting and organized using thematic content analysis (Lefuma, 2017). Before data was analyzed, it had to be cleaned in order to check its consistency and reliability, as well as for completeness.

Recorded data were evaluated, and subjected to themes by coding and developing of data (Creswell, 2009). Qualitative and quantitative data were summarized before they were processed.

Closed-ended questions from the questionnaires were coded to organize and logically interpret research data and then convert into numerical codes. This was done to allow tabulation and tallied. The open-ended questions were content-analyzed before they were coded; and they were arranged into meaningful related parts or categories (Kumar, 2005). According to Lefuma (2017) quantitative analysis is a process of making meaning from the data collected and as such is essential to reveal the findings of the study. Quantitative data was analyzed using Statistical package for social science (SPSS). It is a computer software program that provides on-screen, self-help tutorial and, like most software programs, it is relatively easy to use at a basic level.

3.9. Validity and Reliability of the Data Collection Instrument

Reliability and validity of the data collection instruments are mostly raised in conducting quantitative research. While preparing the questionnaire, ambiguous or vague wording was avoided to ensure that respondents would read and answer the question consistently on different occasions in the same context. Moreover, reliability and validity of the study is acquired through analyzing data from different sources. The data from different sources can help for crosschecking the information obtained. At the same time, the reliability can be gained during the analysis part when those proved information would interpret in consistent manner.

Reliability implies that if the measure is used by different researchers, it should produce the same result. In other words, if the measure is reliable, respondents rate the variable in the same way so that distinguishable pattern can emerge from the data for an on-going basis to detect change. The data collected was analyzed and processed into meaningful and relevant information. Cronbach's alpha used to assess the reliability of the data collection instrument. Content analysis was used to analyze qualitative data for the study. Data was prepared into percentages, pie charts and tables for better interpretation. Similarly validity as is a way of checking that the instrument is measuring what was intended to measure. There are different types of validity measurements including content validity and construct validity. To meet content validity the questionnaire was prepared based on extensive reading of literature review.

3.10. Pilot Testing

The main purpose of pilot testing is to make sure that the data collection instruments are logical and clear. To achieve this the question in the questionnaire was tested to find out that no vague & confusing questions was included and to avoid the wordings of the question. Five students were

approached to answer the draft of the questionnaires via email. All the respondents reported that they have no difficulty in answering the questions. But some of respondents gave comment that some questions need rephrasing and lack of clarity. Then considering the comment, the researchers make necessary changes. Finally the researcher had administered the questionnaire to the target population via email.

3.11. Summary

The methodology for this research is considered appropriate since it has been compared or cross checked with previous researches. The questionnaires were both quantitative and qualitative in nature for the gathering of necessary data that was useful for the research work and also semi structured telephone interview with IR librarian was taken into consideration. In addition to this, method of data analysis and interpretation was given with the research model (framework) and hypotheses developed from the research frame work. The software proposed to be used for the data analysis is SPSS. The limitation for the research work was the outbreak of COVID-19 pandemic in the world at large and Ethiopia specifically. So the next chapter shows data analysis and interpretation.

Chapter Four
Data Analysis, Discussion of Results & Interpretation

4.1. Introduction

This chapter presents data analysis results of postgraduate students OAIR system usage and satisfaction at Addis Ababa University. Online questionnaires were distributed to respondents. The responses obtained through questionnaires and interview have been analyzed. Therefore, the first section presents the respondents' demographic data and quantitative data have been analyzed by the support of Statistical Package for the Social Science (SPSS) tool version 20.0. Accordingly, for data analysis frequency and percentage were used. The last section presents the findings of the study in relation to the formulated research questions and hypothesis.

4.2. Reliability and Validity of the Data Collection Instruments

Cronbach's alpha coefficient is one of the most commonly used indicators of internal consistency. It is used to measure the reliability of the questionnaire and the alpha values were calculated to evaluate the internal consistency reliabilities of the scales. The regular range of Cronbach's coefficient alpha test value is between 0.0 and +1.0, and the higher values indicate that a good level of consistency. The Cronbach's Alpha score of 1.0 indicate 100 percent reliability. The SPSS statistics manual states that the scale is considered reliable if the alpha value is greater than or equal to 0.7 and if the scale is below 0.7 then the scale is not reliable (IBM SPSS statitistis, 2013). The total Cronbach's Alpha value for the DeLone and McLean's model constructs is shown in the Table 4.1 presented below. From this table it indicates that the internal consistency (reliability) of all the questionnaire items is above 0.7 which is good internal consistency. Similarly Table 4.2 shows the results of alpha coefficients for each factor with reliability analysis.

Table 4.1. Reliability of questionnaire items

Reliability Statistics	
Cronbach's Alpha	**N of Items**
.858	**28**

Table 4.2. Reliability of the model factors

Construct	Cronbach's Alpha	MEASUREMENT ITEMS
Information Quality (IQ)	**0.844**	IQ1. The information provided by the OAIR system is Up-to-date.
		IQ2. OAIR system provides me accurate and complete information.
		IQ3. OAIR system provides me relevant information you need.
		IQ4. The information provided by OAIR system is easy to understand
System quality(SQ)	**0.870**	SQ1. The interface of the OAIR system is attractive.
		SQ2. I find OAIR system user-friendly and easy to use.
		SQ3. I find OAIR systems reliable.
		SQ4. The OAIR systems is available all the time.
		SQ5.The response time of the system is reasonable.
Service quality (ServQ)	**0.736**	ServQ1. I was trained to use the system.
		ServQ2. The user interface of the system has a well-organized appearance
		ServQ3. The responsible body is willing to help whenever I need support while the system
		ServQ4. The responsible service personnel provide services related to the system at the promised time.
Self-efficacy (SE)	**0.835**	SE1. I have a basic knowledge on how to use OAIR system.
		SE2. I use OAIR system if someone has showed me how to

		do it first.
		SE3. The university offers training programs regarding OAIR system
		SE4. I advise my colleagues to use the OAIR system.
User satisfaction (US)	**0.797**	US1. I am satisfied with the performance of OAIR system
		US2. Use of OAIR is an enjoyable experience.
		US3. I am satisfied with effectiveness and efficiency of OAIR system.
		US4. I feel satisfied with the quality of information provided by the OAIR system.
Behavioral Intention to use(BI)	**0.858**	BI 1. The system helps me to get what I need.
		BI 2. I intend to use OAIR system frequently
		BI 3. I will to recommend other people to use the system
		BI 4. I am very likely to use the system in the future
Actual Usage(AU)	**0.726**	AU1. I use OAIR frequently
		AU2. I use many of the function in OAIR system
		AU3. I spent a lot of time using the system

4.3. Demographic Characteristics of Respondents

4.3.1. Gender

There were a total of 125 responses. After data screening, which involved the removal of incomplete or unengaged responses, 122 valid responses remained. Of the total 122 responses, 36.9 % were female while the remaining 63.1 % were male.

Table 4.3. Gender of Postgraduate Student

Gender		**Frequency**	**Percent**	**Cumulative percent**
Valid	Male	77	63.1	63.1
	Female	45	36.9	100.0
	Total	122	100.0	

The above Table 4.3 shows that (77) (63.1%) of the respondents were Male and the remaining (45) (36.9%) of the respondent were females. This shows that there are more male postgraduate

students than female postgraduate students. This is because the proportion of female post graduate students is very small in the universities.

4.3.2. Age

The following Table 4.4 depicts the frequencies and percentages of the respondents' age group. The Majority of respondents' fall in the age group between 31-35 years followed by 26-30 years, 36-40 years, below 25 and then above 40 which account 38.5%, 27.0%, 18.9%, 12.3 % and 3.3% of the total respondents' age category respectively. The study shows that, respondents between the ages of 31-35 are in the dominant group.

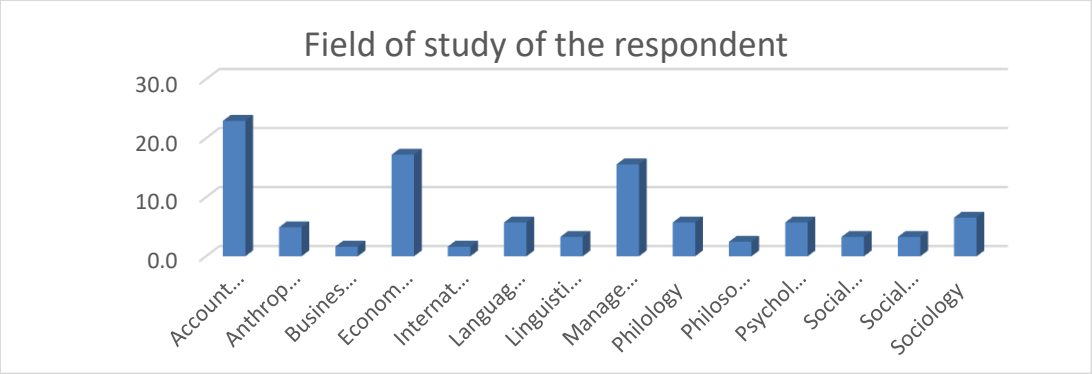
Table 4.4. Age of Respondents participated in the survey

Respondents' Age Range	Frequency	Percent
Below25 Years	15	12.3
26- 30 Years	33	27.0
31-35 Years	47	38.5
36-40 Years	23	18.9
Above 40	4	3.3
Total	122	100.0

4.3.3. Department

Regarding the respondents field of study, the highest number of the respondent with 23.0% (28) were from accounting & finance department, 17.2% (21) from Economics department and 15.6 %(19) from Management department.

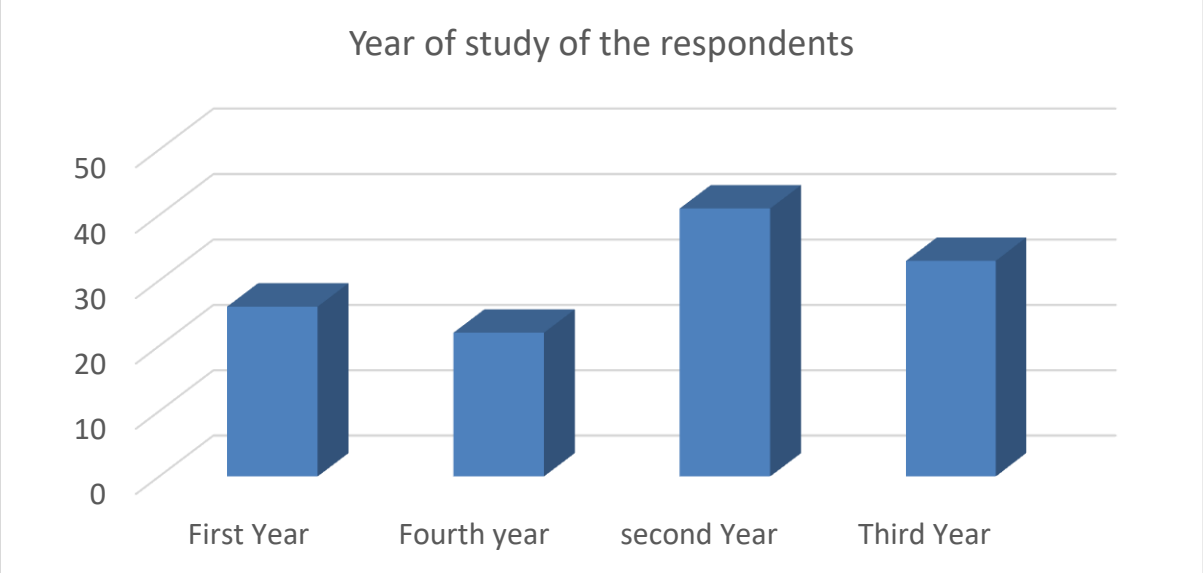
Figure 4.1.Field of study of the respondents



4.3.4. Year of study

At the time of survey, majority of the respondents were second year students 41(33.6%) followed by third Year students 33 (27.0%), first year student 26(21.3%) and fourth year 22(18.0%).

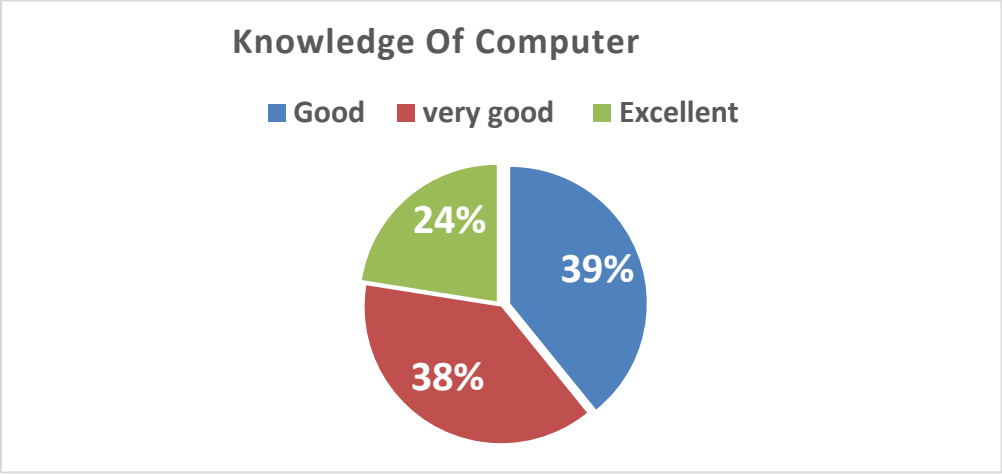
Figure 4.2. Year of study of the respondents



4.3.5. Knowledge of Computer

In the survey respondents were asked to rate their knowledge of computers and information technologies (IT). Accordingly, low, good, undecided, very good and excellent (Figure 4.3.) Most of respondents rate their knowledge of computer as “GOOD”. None of respondents rate their knowledge as low or undecided. This shows that postgraduate students has no problem in relation to using computers.

Figure 4.3. Knowledge of Computer



4.3.6. Usage of open access institutional repository

Respondents were asked for how long they used the system. As shown from the Table 4.5 below, majority of respondents which account 35.2%, used the system for 3-5 years followed by 34.4% for 1-2 years and 24.6% used for less than 1 year. Only one respondent have used the system for more than 10 years.

Table 4.5. Usage of OAIR

Year	Frequency	Percent
1-2 years	42	34.4
3-5 years	43	35.2
6-10 years	6	4.9
Above 10 years	1	.8
Less than 1year	30	24.6
Total	122	100.0

4.3.7. Private Computer and Internet Connection

Majority of the respondents have their own private computer with 113 (92.6%) and the rest 9(7.4%) of them didn't have their private computer. Respondents who have an Internet

connection at their home were account 80(65.6%) and only 42(34.4%) of respondents have internet connection at their home.

Table 4.6. Private Computer access and Internet connection

	Yes	**No**
Private Computer	**113(92.6%)**	**9(7.4%)**
Internet Connection	**42(34.4%)**	**80(65.6%)**

4.3.8. Problems faced while accessing OAIR system

Regarding to the challenges that postgraduate students face while using open access institutional repositories include, not being capable of finding the required material easily. This is the most challenging issue and account for 83.6% of the respondents. This is followed by lack of user manual and guideline to use the system and covers 78.7% of the respondents. The third challenge, not having proper guidance and training, covers 75.4% of the response. Other challenges include lack of internet, electric power (43.6%); Fear of using new technology (34.4%), lack of background knowledge about the existence of this system and complicated user interface.

Table 4.7. Challenges of using OAIR

Category of challenges	**problematic**	**No problem**
Fear of using new technology	**34.4%**	**65.6%**
Lack of user manual and guideline to use	**78.7%**	**21.3%**
Unable to find the required material easily	**83.6%**	**16.4%**
Lack of internet, electric power	**43.6%**	**56.4%**
Complicated User interface	**50.8%**	**49.2%**
No proper guidance and training	**75.4%**	**24.6%**
Lack of background knowledge	**68.9%**	**31.1%**
Lack of exposure to use the system	**26.2%**	**73.8%**

4.4. Statistical Analysis for the Hypothesis Testing

The questionnaire contains responses that are rated based on five point Likert scale. The original Likert scale had five levels which are Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. As we can see from Table 4.8, In order to simplify the data analysis the Likert scale derived in to three levels: strongly agree and agree combined to Agree, strongly disagree and disagree combined to Disagree, and Neutral remained as Neutral.

Table 4. 8. Derived Likert scale

Strongly Agree	Combined to form "Agree"
Agree	
Disagree	Combined to form " Disagree"
Strongly Disagree	

4.4.1. Information Quality

The finding in Table 4.9 shows the respondents answer to items related to information quality. The majority of respondents disagree that the information displayed on the OAIR system is up-to-date which account 46.8% , 27.4% of respondent responded "Neutral " and 25.8% agreed that the information provided by the system is up-to-date. Referring to the accurateness and completeness of the information provided by the system, around 51.6% of the respondent dissatisfied while nearly 18% satisfied and 30% responded neutral. Regarding to the relevancy of the information, around 48.4% of the respondent dissatisfied while nearly 18% and 34% were unsure. Approximately 34% of respondents found OAIR system is easy to understand and 35.5% disagreed and 30.6% are "Neutral "agreement Generally, the information quality needs to give high attention based on the needs of all users.

Table 4.9. Percentage response for Information quality items

Question items of Information quality	Percentage (%)		
	Agree	Neutral	Disagree
The information provided by the OAIR system is Up-to-date.	25.8	27.4	46.8
OAIR system provides me accurate and complete information.	17.7	30.6	51.6
OAIR system provides me relevant information.	17.7	33.9	48.4
The information provided by OAIR system is easy to understand	33.9	30.6	35.5

4.4.2. System Quality

From the result on the Table 4.10, 77.4% of the respondents agreed about the attractiveness of OAIR system and 72.6% of the respondents found OAIR system user-friendly & easy to use, around 5% found it difficult to use the system. Regarding the reliability of the system 69.4% of the respondents indicated that the system was reliable while 24% of the respondents unsure and 6.5% have indicated that the reliability of system was low. In terms of the availability of OAIR system, 56.5% of respondents get the system available all the time, but 29% of the respondents disappointed with the availability of system. Around 68 % of the respondents agreed about the response time of the system while nearly 8.1% were disagree and 24% were unsure.

Table 4.10. Percentage response for system quality items

Question items of System quality	Percentage (%)		
	Agree	Neutral	Disagree
The interface of the OAIR system is attractive.	77.4	16.1	6.5
I find OAIR system user-friendly and easy to use.	72.6	22.6	4.8
I find OAIR systems reliable.	69.4	24.2	6.5
The OAIR systems is available all the time.	56.5	14.5	29.0
The response time of the system is reasonable.	67.7	24.2	8.1

4.4.3. Service Quality

The researcher sought to find out service quality of OAIR system. Table 4.11 below indicates the respondent's response on Service quality. The respondent who were trained to use the system account 25.8% and 29% of respondent were unconfident to answer this item while about 45.2% of the respondent were disagreed. Furthermore, 54.8% of the respondent agreed that the user interface of the system has a well-organized appearance and the respondent who were unsure to answer this question were 29% and 16% of the respondents disagreed. In terms of getting the support provided for solving problems from the responsible body i.e. university librarian around 27.4% of respondents were satisfied, 42% of respondents were dissatisfied and 30.6% of respondents were unsure.

Table 4.11. Percentage response for service quality items

Question items of Service quality	Percentage (%)		
	Agree	Neutral	Disagree
I was trained to use the system.	25.8	29.0	45.2
The user interface of the system has a well-organized appearance	54.8	29.0	16.1
The responsible body is willing to help me whenever I need support.	27.4	30.6	41.9
The responsible service personnel provide services related to the system at the promised time.	25.4	32.6	43.9

4.4.4. User satisfaction

From the results on Table 4.12, 56.5% of the respondents were satisfied with the performance of OAIR system while 30.6% uncertain and the rest 12.9% dissatisfied with the system. The result revealed that 53.2% respondents agreed that use of OAIR as an enjoyable experience for them and 25.8% disagree and the rest 21% were uncertain. In terms of the effectiveness and efficiency of OAIR system, 60% of respondents were satisfied and 13% dissatisfied and 27.4% were uncertain about their satisfaction. The respondents who were satisfied with the quality of information provided by the OAIR system account for 56.5%, while 17.7% were uncertain.

Table 4.12. Percentage response for User satisfaction items

Question items of User satisfaction	Percentage (%)		
	Agree	Neutral	Disagree
I am satisfied with the performance of OAIR system	56.5	30.6	12.9
Use of OAIR is an enjoyable experience.	53.2	21.0	25.8
I am satisfied with effectiveness and efficiency of OAIR system.	59.7	27.4	12.9
I feel satisfied with the quality of information provided by the OAIR system.	56.5	25.8	17.7

4.4.5. Actual Usage

The researcher ought to evaluate actual usage of the OAIR system. The finding shows 43.5% of the respondent used the OAIR system frequently in their daily activity. The respondent who were uncertain about frequently using the system in their activity were 29%, while 27.4% of the respondents disagreed. Concerning time spent using the system, 43.5% of respondents agreed that they spent a lot of time using the system, 29% disagreed and 27.4% of respondents were uncertain about their response.

Table 4.13. Percentage response for Actual usage items

Question items Actual usage	Percentage (%)		
	Agree	Neutral	Disagree
I use OAIR frequently	43.5	29.0	27.4
I use many of the function in OAIR system	40.3	37.1	22.6
I spent a lot of time using the system	43.5	27.4	29.0

4.4.6. Self-Efficacy

As shown in Table 4.14 below, indicated the percentage answers of respondent for the Self-efficacy dimension. 64.5 % of the respondent indicated that they have a basic knowledge on how to use OAIR system, 18% respondents indicated that they were unsure while 18% of the respondent expressed they do not have a basic knowledge on how to use OAIR system.

Besides, the findings also specify that 35.5% of the respondent agreed that they can use OAIR system if someone else has showed them how to do it first; 34% of the respondents indicated that they were unsure, while 30% of the respondent weren't able to use OAIR system even if somebody shows them how to do it. Regarding to the training program offered by the university about the use of OAIR system, 58% of the respondents disagree, while 22.6% of them not sure and the rest 19.4% agreed that the university offered training on how to use the system. Finally, 45.2% of respondents agreed about recommending their colleagues to use the system and the rest 14.5% disagreed.

Table 4.14. Percentage response for Self-efficacy items

Question items of Self-efficacy	Percentage (%)		
	Agree	Neutral	Disagree
I have a basic knowledge on how to use OAIR system.	64.5	17.7	17.7
I use OAIR system if someone else has showed me how to do it first.	35.5	33.9	30.6
The university offers training programs regarding OAIR system.	19.4	22.6	58.1
I advise my colleagues to use the OAIR system.	45.2	40.3	14.5

4.4.7. Behavioral Intention to use

The researcher sought to understand Behavioral Intention to use the OAIR system by postgraduate students. As the findings in Table 4.15 shows that 29% of the respondent agreed that system helps them to get what they need and 40% of them indicated that system didn't help them to get what they need and the rest 30 % of respondents uncertain about their responses. The finding also specifies that 27% of the respondents agreed to use OAIR system frequently. About 34% of the respondents were not sure whereas 38.7% were not interested to use OAIR system frequently. In similar manner, regarding to the recommending other people to use the system, around 29% of the respondent agreed. Also, 42% of the respondent were unsure to respond this question while 29% of the respondents disagreed. Finally, 32% of the respondent agreed to use the system in the future and 32% of the respondent who were not sure to answer this question were 35.5%, and 32.3% of the respondents disagreed or weren't interested to use the system in the future.

Table 4.15. Percentage response for Behavioral Intention to use items

	Percentage (%)		
Question items of Behavioral Intention to use	Agree	Neutral	Disagree
The system helps me to get what I need.	29.0	30.6	40.3
I intend to use OAIR system frequently	27.4	33.9	38.7
I will to recommend other people to use the system	29.0	41.9	29.0
I am very likely to use the system in the future	32.3	35.5	32.3

4.5. Hypothesis testing

In this research hypothesis testing was executed to investigate the relationship between variables of the model and to measure independent variable that have effect on dependent variable which was information quality, system quality, service quality and self-efficacy that have an impact on user satisfaction and behavioral intention to use which in turn affect actual usage of the system. For this study, in order to perform hypothesis testing among 11 hypotheses, linear regression analysis was used. It is used to measure how much the impact of independent variables on dependent variable.

Linear regression analysis is a modeling technique, which can be used to find the impact of one or more independent variables on a dependent variable. A linear regression tells that what contribution have those independent variables make to the variance in the dependent variable or how much variance do the independent variables explained in the dependent variable. Moreover, the R- square analysis (linear regression) was used to test the impact of the predictor or Independent variables on the dependent variable.

In order to perform hypothesis testing both the independent variables and the dependent variable are integrated and tabulated in SPSS. Hypothesis testing relies on the standardized coefficient significant (P value) and also the standardized coefficient (Beta value). To support the hypothesis, the statistical significant value should be below 0.05 (the minimum probability to reject or accept the hypothesis) and the standardization coefficient (beta value) should be greater than 0.1 which is the accepted rate. In order to calculate standardized coefficient (Beta value) and the significant of the standardized coefficient (P value) the following steps were followed:

1. Independent variable: System quality, information quality, service quality and self-efficacy were individually regressed against the dependent variable user satisfaction .(Hypothesis H1, H3, H5, H7)
2. Independent variable: System quality, information quality, service quality, self-efficacy and user satisfaction were individually regressed against the dependent variable behavioral intention to use .(Hypothesis H2, H4, H6, H8, H9)
3. Independent variable: User satisfaction and behavioral intention to use regressed with dependent variable actual usage. (Hypothesis H10, H11)

Accordingly the following results were obtained:

Hypothesis 1, System quality and User Satisfaction: that is System Quality increases user satisfaction of the open access institutional repository that is accepted because of standardization coefficient that equals to 0.290, which is greater than the accepted rate 0.1 and the significant is 0.001, which is lower than the accepted rate 0.05. This result is similar with the findings of Mohammadi (2015), Shaltoni et al. (2015), Lwoga (2013) and Alzahrani et al. (2019).

Hypothesis 3, Information quality and User Satisfaction: that is Information Quality increases user satisfaction of the open access institutional repository that is accepted because of standardization coefficient that equals to 0.303, which is greater than the accepted rate 0.1 and the significant is 0.000, which is lower than the accepted rate 0.05. This result is similar with the findings of Shaltoni et al. (2015), Lwoga (2013), and Alzahrani et al. (2019).

Hypothesis 5, Service quality and User Satisfaction: that is Service Quality increases user satisfaction of the open access institutional repository that is accepted because of standardization coefficient that equals to 0.343, which is greater than the accepted rate 0.1 and the significant is 0.000, which is lower than the accepted rate 0.05. This result is similar with the findings of Yakubu & Dasuki, (2018) but contradicted the finding of Lwoga (2013)

Hypothesis 7, Self-efficacy and User Satisfaction: that is Self-efficacy increases user satisfaction of the open access institutional repository that is rejected because of standardization coefficient that equals to 0.343, which is greater than the accepted rate 0.1 but the significant is 0.102, which is greater than the accepted rate 0.05.

The R-square is the amount of variance in the dependent variable (user satisfaction) explained by the predictor variables taken together (Self-efficacy, Information-quality, Service-quality,

System-Quality). According to the result of Table 4.16, R^2=.407; Taken as a set, the predictors Self-efficacy, Information quality, Service quality, System quality for 40.7% of the variation in user-satisfaction (dependent variable).

Table 4.16. R-Square analysis for User Satisfaction

Model Summary[b]				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	**.638[a]**	**.407**	**.386**	**1.73040**
a. Predictors: (Constant Self-Efficacy, Information-Quality, Service-Quality, System-Quality)				
b. Dependent Variable: user-satisfaction				**Source. SPSS Result**

The ANOVA table shows the model's statistical significance. The result is statistically significant as we can see from the ANOVA Table 4.17. Therefore, it can be concludes that the overall regression model was statistically significant, F (4,117) = 20.051, p<.001, R2 =.407

Table 4.17. ANOVA analysis for user satisfaction

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	**Regression**	**240.159**	**4**	**60.040**	**20.051**	**.000[b]**
	Residual	**350.333**	**117**	**2.994**		
	Total	**590.492**	**121**			
a. Dependent Variable: user-satisfaction						
b. Predictors: (Constant), Self-Efficacy, Information-Quality, Service-Quality, System-Quality						

Source: SPSS Result

Table 4.18. Coefficient analysis for user satisfaction

Coefficients[a]						
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.835	.900		-.928	.355
	Information-Quality	.253	.060	.303	4.212	.000
	System-Quality	.237	.067	.290	3.559	.001
	Service-Quality	.321	.075	.343	4.275	.000
	Self-Efficacy	.137	.083	.127	1.649	.102
a. Dependent Variable: user-satisfaction						

Source: SPSS Result

The above Table shows the contribution of each of the independent variable to variation on the dependent variable. In other words, it is necessary to check which variable included in the model contributed much to the prediction of dependent variable (user satisfaction) (see Table 4.18).

In order to compare the contribution of each of the independent variable, it is important to look at Beta value under standardized coefficient column. Here, Information quality, system quality, service quality and self-efficacy have beta value of 0.303, 0.29, 0.343 and 0.127 respectively. This implies that service quality makes strong unique contribution followed by information quality and system quality to explaining the dependent variable (user-satisfaction). The beta value for self-efficacy was 0.127 indicating less contribution. It is also rejected because it statistical significance is above the threshold of alpha value (i.e. less than 0.05).

Based on the standardized coefficient beta value obtained, the researcher finds that for each 1% change in service quality dimension leads to a 34.3 % increases in user satisfaction of the system, for each 1% change in information quality dimension leads to 30.3% increase in user satisfaction. Similarly, 1% change in system quality dimension leads to 29% increase in user satisfaction.

From the above four hypotheses (H1, H3,H5,H7): Service Quality (H5) has the strongest effect on user satisfaction of open access institutional repository, because standardization coefficient is equal 0.343 that is greater than the other factors that affect user satisfaction of open access institutional repository.

The relationship between the independent variable System quality, Information quality, service quality, self-efficacy and user satisfaction with the dependent (output variable) Behavioral Intention was tested using the linear regression as explained below.

Table 4.19.R-Square analysis for Behavioral Intention

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.756[a]	.571	.552	1.79255
a. Predictors: (Constant), user-satisfaction, Information-Quality, Self-Efficacy, System-Quality, Service-Quality				

Source: SPSS Result

The amount of variance in the dependent variable (Behavioral-Intention) explained by the predictor variables taken together (Self-Efficacy, Information-Quality, Service-Quality, System-Quality). According to the result of Table 4.19, R^2=.571; Taken as a set, the predictors Self-Efficacy, Information quality, Service Quality, System Quality for 56.3% of the variation in Behavioral-Intention (dependent variable).

Table 4.20. ANOVA analysis for Behavioral Intention

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	495.986	5	99.197	30.871	.000[b]
	Residual	372.735	116	3.213		
	Total	868.721	121			
a. Dependent Variable: Behavioral-Intention						
b. Predictors: (Constant), user-satisfaction, Information-Quality, Self-Efficacy, System-Quality, Service-Quality						

Source: SPSS Result

From the ANOVA table above which shows the models statistical significance the result is statistically significant as we can see from Table 4.20. Therefore, it can be concluded that the overall regression model was statistically significant, F (5,116) = 20.051, p<.001, R^2 =.571

Table 4.21. Coefficient analysis for behavioral intention

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.969	.936		1.035	.303
	Information-Quality	.608	.067	.599	9.087	.000
	System-Quality	-.151	.073	-.152	-2.077	.040
	Service-Quality	-.200	.084	-.176	-2.387	.019
	Self-Efficacy	.461	.087	.354	5.308	.000
	User-satisfaction	.139	.096	.115	1.455	.148
a. **Dependent variable: Behavioral-Intention**						

Source: SPSS Result

The above Table 4.21 shows the contribution of each of the independent variables to variation on the dependent variable (behavioral intention) it is important to look at Beta value under standardized coefficient column. Here Information quality and self-efficacy have beta value of 0.599 and 0.354 respectively. This implies that Information quality makes stronger unique contribution followed by self-efficacy to explain the dependent variable (Behavioral Intention). The beta value for system quality and service quality was lower indicating less contribution. It is also even rejected because standardization coefficient value 0.092 <0.05. Further the significance value for user satisfaction 0.148>0.05 which is insignificant.

Hypothesis 2, System quality and behavioral intention to use: that is System Quality increases behavioral intention to use the open access institutional repository that is rejected because of the significant is -.152, which is higher than the accepted rate 0.05.

Hypothesis 4, Information quality and behavioral intention to use: that is Information Quality increases user satisfaction of the open access institutional repository that is accepted because of standardization coefficient that equals to 0.599, which is greater than the accepted rate 0.1 and the significant is 0.000, which is lower than the accepted rate 0.05.

Hypothesis 6, Service Quality and behavioral intention to use: that is Service Quality increases behavioral intention to use the open access institutional repository that is rejected because the significant is -.176, which is equals to the accepted rate 0.05.

Hypothesis 8, Self-efficacy and behavioral intention to use: that is Self-efficacy increases behavioral intention to use the open access institutional repository that is accepted because of standardization coefficient that equals to 0.354, which is greater than the accepted rate 0.1 and the significant is 0.000, which is lower than the accepted rate 0.05.

Hypothesis 9, User Satisfaction and behavioral intention to use: the hypothesis User Satisfaction increases behavioral intention to use of the open access institutional repository that is rejected because the significant is 0.148, which is higher than the accepted rate 0.05.

Hypothesis 10, User Satisfaction and Actual usage: that is User Satisfaction increases actual use of the open access institutional repository system that is accepted because of standardization coefficient that equals to 0.480, which is greater than the accepted rate 0.1 and the significant is 0.000, which is lower than the accepted rate 0.05.

Hypothesis 11, Behavioral intention to use and Actual usage: Behavioral intention to use OAIR system increases actual usage of the open access institutional repository system that is rejected because of the significant is 0.333, which is greater than the accepted rate 0.05.

The R-square is the amount of variance in the dependent variable (Actual usage) explained by the predictor variables taken together (user satisfaction and behavioral intention to use). According to the result of table 4.25, R^2=.253; Taken as a set, the predictors user satisfaction and behavioral intention to use for 25.3% of the variation in Actual usage (dependent variable).

Table 4.25. R-Square analysis for Actual usage

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.503[a]	.253	.241	1.70128
a. Predictors: (Constant), user-satisfaction, Behavioral-Intention				

Source: SPSS Result

The ANOVA table shows the model's statistical significance. The result is statistically significant as we can see from the ANOVA Table 4.26. Therefore, it can be conclude that the overall regression model was significant, F (2,119) = 20.203, p<.001, R^2 =.253

Table 4. 26. ANOVA analysis for Actual usage

ANOVA[a]						
Model		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
1	**Regression**	**116.950**	**2**	**58.475**	**20.203**	**.000[b]**
	Residual	**344.427**	**119**	**2.894**		
	Total	**461.377**	**121**			
a. Dependent Variable: Actual-Usage						
b. Predictors: (Constant), user-satisfaction, Behavioral-Intention						

Source: SPSS Result

Table 4.27 presented below shows the contribution of each of the independent variable to variation on the dependent variable. In other words, it is necessary to check which variable included in the model contributed much to the prediction of dependent variable (Actual usage).

Table 4. 27. Coefficient analysis for Actual usage

Coefficient [a]					
	Unstandardized Coefficients		**Standardized Coefficients**		
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1 (Constant)	**2.482**	**.612**		**4.057**	**.000**
User-satisfaction	**.424**	**.072**	**.480**	**5.906**	**.000**
Behavioral-Intention	**.058**	**.059**	**.079**	**.971**	**.333**
a. **Dependent Variable: Actual-Usage**					

Source: SPSS Result

In order to compare the contribution of each of the independent variable, it is important to look at Beta value under standardized coefficient column. Here, user satisfaction has value of 0.48 and behavioral intention has value of 0.079. This implies that user satisfaction makes stronger unique contribution to explaining the dependent variable (Actual usage), when variance explained by other variable in the model is controlled for. The beta value for behavioral intention was 0.079 indicating less contribution. It is rejected because it statistical significance is above the threshold of alpha value (i.e. less than 0.05).

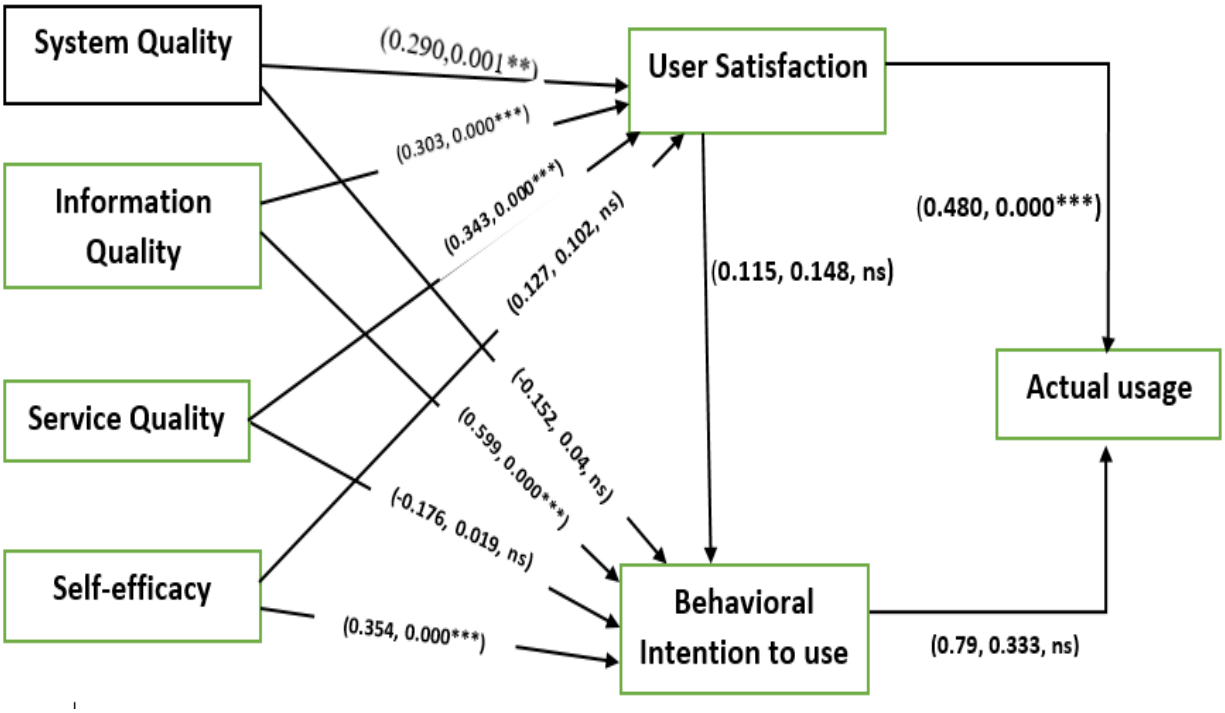
Based on the beta value obtained, the researcher finds that for each 1% change in user satisfaction dimension leads to a 48% increases Actual usage of the system. Or if we increase

user satisfaction by one standard deviation then actual usage increases by 48% (0.48) standard deviation unit. Therefore, from this, the researcher concluded that raising user satisfaction leads to increase actual usage of the system.

Table 4.28. Summaries of the hypothesis tests

Hypothesis	**PATH**			**Standardization coefficient (P)**	**Significant**	**Acceptance/rejection of the hypothesis**
H1	SQ	→	US	0.290	0.001	Accepted
H2	SQ	→	BI	-0.152	0.040	Rejected
H3	IQ	→	US	0.303	0.000	Accepted
H4	IQ	→	BI	0.599	0.000	Accepted
H5	ServQ	→	US	0.343	0.000	Accepted
H6	ServQ	→	BI	-0.176	0.019	Rejected
H7	SE	→	US	0.127	0.102	Rejected
H8	SE	→	BI	0.354	0.000	Accepted
H9	US	→	BI	0.115	0.148	Rejected
H10	US	→	AU	0.480	0.000	Accepted
H11	BI	→	AU	0.79	0.333	Rejected

From the hypothesis tested above 11 relationships tested, only 6 were found to be significant. H1, H3, H4, H5, H8, and H10 were all supported while there was no support for H2, H6, H7, H9 and H11. All the quality antecedents' i.e. Information quality, system quality and service quality found to be significantly influence user satisfaction. From the quality antecedents' only Information quality, and self-efficacy found to be statistically significant to influence behavioral intention to use the system. User satisfaction was found to influence behavioral intentions to use and actual usage. The final relationship is between, behavioral intentions and actual usage and this was found to be non-significant.



= Good * very good ns=not significant

Figure 4.5. The research model and relationship between the dimensions

4.6. Qualitative results

In addition to the quantitative study, qualitative data analysis was conducted to deeper understanding the reaction of the respondents about the dimension of research model. In addition, the qualitative approach was conducted by interviews which were used to clarify the findings obtained from the survey. Interviews have been conducted with both expert of the open access institutional repository and postgraduate students in Addis Ababa University. Therefore, in this research one expert and five postgraduate students were interviewed. The researcher first communicated via email and then via phone to request the respondents willingness for the phone interview. After having respondents' agreement to participate in the research, the researcher scheduled the time and date that the respondents will be free to communicate.

At time of the interview sessions, the researcher first explained the purpose of the research and started asking questions. All the respondents were interviewed by the researcher, for about 10 to 15 minutes.

The identity of the respondents and all information they provide would be treated confidential and detailed personal information of the respondents removed to allow for anonymity in response. The interview guide is included in this report as Appendix 2&3. The discussion of interview outcome follows next and the information collected was presented in an interpretive qualitative research reporting style where a summary of findings are presented followed by illustrative quotes of respondents and interpretations of the researcher with descriptions and analysis of the data.

This sections summarize the interview result for concepts in the model. The themes extracted were emerged from the phone interview conducted and were categorized according to the concepts in the model. This includes quality of IT support service, availability of required information, quality of the system and training. The research model variables information quality, system quality, service quality, self-efficacy, user satisfaction, behavioral intention to use and actual system usage from both system administrators and postgraduate students point of view were described to generalize the findings of survey results.

About the OAIR of the AAU, the system administrator states as:

> *There is an IR where students's thesis and dissertation is available for open access. The OAIR system tried to make the university research outputs visible and open to users. This is a showcase of the institute's research outputs. This helped the university get ranked in the international ranking organizations. There is also an online journal management system in the form of Ethiopian Journal Online (EJOL) where Journal publications from the university and local journals made available online and open access. The university also provides subscribed journals and databases where users get recent publications in different disciplines from all around the world.*

The next section of the interview questions was about the information quality constructs of the system under study.

Some themes related to the quality of the system were discussed in the interview. Participants had mention how the system and information quality influenced their satisfaction towards the actual usage of the system. From the interview result regarding to the information quality constructs, most of respondents emphasized that the information displayed on the system is not up to date and the system does not provide the information demanded by the user. Further

respondents underlined that the when they search for desired information resource i.e. article, thesis and dissertation, it is very difficult to get theses information resources directly from OAIR system as compare to Google scholar and other similar research portals. The system administrator also explained problems regarding the quality and up-to-datedness of information resource on the system as:

> *The research outputs (Thesis and dissertation) from previous academic year postgraduate students collected by staffs and made available between 2-4 months after graduation which make delay in submission system. Additionally, some research outputs may not be made available in the IR system due to poor format and the media by itself may have problems (thesis work submitted in CDs may not open.)*

Regarding to online journal management system the system administrator further explained as:

> *There is delays, usually journal owners upload backlog. Although the system supports all the publication process online, journals are not using that feature yet. Otherwise the university has subscribed journals and databases where users usually get up-to-date information.*

Hence as can be seen from the interview result regarding the information quality related problems, the information quality of the OAIR system has a direct impact towards user satisfaction and behavioral intention to use the system. The finding by (Ajoye, 2014; Jaafreh, 2017; Yakubu & Dasuki, 2018) stated similar idea to this finding because they outlined that Information quality found to have positive and significant relationship with user satisfaction and behavioral intention to use the system.

The system quality of OAIR is measured in terms of ease of use, navigation, design and response time. Most of the respondents replied that:

> *The user interface of system is attractive, consistent and have considerable response time. Further, the system is simple to use if user has basic knowledge of computer and can access all necessary information resources available on it.*

They was also agreed that the system is available all the time and have considerable response time. As pointed out by one of the respondent, because the system easy to use by students, it

reduces the challenge student face due to complex system. Similarly the system administrator responded regarding the system quality as:

> *The AAU OAIR as a system the user interface is not complicated and difficult to use and access the information resource. The system interface design and information organization is presented according to the international standards. And I am sure that it will not be a problem for the users to easily access and use the information resource from our system.*

Therefore, the researcher concludes that participants were positive about the quality of the system. However, issues were mentioned related to system layout design of the system under study.

A common theme with the respondents from the phone interview was about the quality of support service provided to postgraduate students related to the usage of system. The finding of the interview with the all of interviewees about the **service quality** construct revealed that they access and use the system remotely, there was no mechanism to ask support from the responsible body when problems faced. But among the respondents, one of the postgraduate student expressed that "*the offline support in university library lab is not as of expected"*. Further postgraduate students explained that no formal and continuous skill gap training was provided by the university on how to use the system. This issue resulted in postgraduate students being unsatisfied with the lack of unavailability of the first line support while using the system from the concerned body. A low service quality had negative impact on user satisfaction of system. Further, the finding of the interview with the system administrator regarding the service quality revealed that for those of users in the library and ask for help, they provide the support service needed. But for those who use the system remotely there is no mechanism to immediately assist or support them online, he said that this is due to lack of responsible assigned personnel in the university library system who is trained to support remote users and the system also does not support the online support feature. Saurashtra university open access repository for example provides support to users through frequently asked questions databases and for further information users can communicate via email to library professionals. This implies that because of lack of online users support feature, awareness creation program and trained staff the service quality constraint affects the level of satisfaction and intention of postgraduate students to use the OAIR system under study.

Regarding to **user satisfaction** construct, having the above mentioned problems at hand, the postgraduate students expressed that they are satisfied with the OAIR system. The system administrator also expressed that:

> *Apart from seeing usage statistics, receiving encouraging words from users and more general survey collected, there was not a formal user satisfaction measurement mechanisms that specifically used to collect the satisfaction level of the OAIR users regarding the access and use to our electronic resources portals.*

Training appeared to be an important topic and one of the key themes in the interview conducted. Postgraduate students gave their views on need for a high quality user training as an important factor for using the system effectively and efficiently. Most of respondents expressed that they didn't participate in any of the training in the University library. They didn't even know there was training program facilitated by the University library. Further they expressed that they use the system based on the general knowledge they have. But among the respondents, one of the respondents stated that

> *Yes, I have participated in the training program regarding to scholarly publishing and open access institutional repository, which is organized by collage of behavioral studies. I saw notice for training from the board library.*

The researcher asked the system administrator: *Do you have any formal training program that given to post graduate students to use the system?* The system administrator expressed that

> *There is usually an orientation program during new student admission at the beginning of the new academic year, which covers topics on usage of open access repositories and subscribed journal that are available in the university. In addition to that sometimes there are different trainings conducted on journal database access in cooperation with journals e.g. Elsevier.*

Relating to **actual system usage**, the researcher ask question to system administrator that *do you believe that the students use OAIR system continuously to perform their research activities in the university?* The system administrator replied that:

> *Since the system is voluntary, it is difficult to say they use it continuously; one problem is being not able to use statistical measures. Usually at the beginning of*

their research students advise the thesis and dissertation repository to check for potential titles of interest. They would rather use Google and other search engines to search for related materials i.e. books, Journal articles, thesis and dissertation.

Finally considering challenges that discourage postgraduate students to not use open access institutional repositories both respondents and the system administrator point out some of the following points such as Low bandwidth, Quality issues, Not finding the latest publication timely, Poor design of the systems, Not finding all resources at one place, as challenge. Users need to access the different systems through single interfaces, and Users do not have the chance to get items filtered by different statistical measures e.g. most downloaded items and most visited items.

4.7. Discussion

This study uses the conceptual research model that was developed based on DeLone and McLean IS success model (Delone & McLean, 2003) and the study of (Compeau & Higgins, 1995) to explore the current level usage and satisfaction of postgraduate students with open access institutional repositories in Addis Ababa University. The model for this research contains seven dimensions: service quality, system quality, information quality, user satisfaction, self-efficacy, behavioral intention, and actual usage.

The study tried to answer the following research questions:

- What is the current level of usage of the PG students towards open institutional repositories?
- What are the factors that predict usage of open access institutional repositories?
- What are the challenges on usage of open access institutional repositories?

4.7.1. Current level of usage of the PG students towards OAIR

The first research question was to investigate the current level of usage of postgraduate students towards using open access journals and institutional repositories.

As analysis result shows the satisfaction level of the postgraduate students towards the actual usage of the OAIR is 48%. This implies that the usability of the system is below 50%, which can be judged as the lower level of usability of the system by postgraduate students.

The conceptual research model dimensions were also looked in detail and the researcher evaluated the relationship between Information quality, system quality, service quality and self-efficacy as a factor that affect user satisfaction and behavioral intention to use which in turn affects with actual usage of the system.

The result of this study suggested that postgraduate students' current level of usage of OAIR system has been mainly affected by Information quality, system quality, service quality and user satisfaction. Two of the hypothetical constructs, self-efficacy and behavioral intention to use have been found to be rejected. Among all the hypothetical constructs service quality has been found to be the strongest predictors of user satisfaction. Finally, the result also shows that user satisfaction singularly explains variation in Actual usage as it has standard coefficient of 0.480.

4.7.2. Factors that predict usage of open access institutional repositories

The study has identified six constructs as predictors of actual usage open access institutional repositories: service quality, system quality, information quality, user satisfaction, self-efficacy and behavioral intention.

System quality (SQ) was hypothesized to influence user satisfaction (US) of OAIR system. The finding from this study supported this relationship. SQ was found to have a positive and significant impact on the of PG students satisfaction of the OAIR system with standardized coefficient that equals to 0.29, and the significant which is equal to 0.001. This result shows that postgraduate students' satisfaction is related to ease of use, attractiveness, reliability, response times and availability of the system. Similarly, different studies have observed the importance of system quality on user satisfaction on different types of information systems. Masrek (2010) has argued that SQ has an effect on user satisfaction. Jaafreh (2017) has found that system quality is significantly related to user satisfaction of system banking technology and usage the system. Like wise, in knowledge management system, system quality has also found to be strongly related to user satisfaction (Wu & Wang, 2006). Similarly, the finding of Ajoye (2014) shows that system quality of the PG school web portal influence user satisfaction. But this study is contrary to the findings of Yakubu & Dasuki (2018).

System quality (SQ) was also hypothesized to influence behavioral intention (BI) to use OAIR system. This is rejected according to our finding as the standardized coefficient equals to -0.152 and significant is 0.040. This result is similar to the finding of Jaafreh (2017) but in contradiction to the findings of Yakubu & Dasuki (2018)

Information quality was proposed to significantly influence BI and US. The finding from this study supported both relationship between IQ & US and IQ & BI. IQ was found to have a positive and significant influence on user satisfaction of OAIR system with standardization coefficient (p value) that equals to 0.303, and the significant which is equal to 0.000. This result is similar with the finding of Jaafreh (2017), Masrek (2010)and Alzahrani et al., (2019) but this result is contrary to findings of Yakubu & Dasuki (2018). On the other hand, IQ was found to have a positive and significant influence on the of postgraduate students behavioral intention to use the OAIR system with standardized coefficient that equals to 0.599, and the significant which is equal to 0.000. This result supported by (Yakubu & Dasuki, 2018;Alzahrani et al., 2019).

Service quality was hypothesized to increase both behavioral intention (BI) to use and user satisfaction (US) of OAIR system. But the finding from this study only supported the relationship between ServQ and US where ServQ was found to have a positive and strong influence on the of postgraduate students satisfaction of OAIR system with standardization coefficient (p value) that equals to 0.343, and the significant which is equal to 0.000. This result is similar with the findings of (Jaafreh, 2017; Masrek, 2010; Alzahrani et al., 2019; Yakubu & Dasuki, 2018) whom said that the higher the qulaity of the service the higher the user will be satisfied.

The non-significance relationship between service quality and behavioral intention (BI) to use with standardization coefficient (p value) that equals to -0.176, and the significant which is equal to 0.019. This result is similar to the findings of (Jaafreh, 2017; Yakubu & Dasuki, 2018) but in contradiction to the finding of by Alzahrani et al (2019).

Self-efficacy was hypothesized to increase behavioral intention (BI). Self-efficacy was found to have a positive and significant influence on the of postgraduate students behavioral intention to use the OAIR system with standardized coefficient that equals to 0.354, and the significant which is equal to 0.000. Self-efficacy was also hypothesized to increase User satisfaction (US).

This hypotheses is rejected because the standardization coefficient that equals to 0.127and the significant which is equal to 0.102.

User satisfaction was hypothesized to increase behavioral intention (BI). This is rejected because the standardization coefficient that equals to 0.115, and the significant which is equal to 0.148. This result contradicts with the finding of Alzahrani etal. (2019).

User satisfaction was also hypothesized to increase Actual usage (AU). The hypothesis is accepted and supports the relationship between user satisfaction and actual usage with standardization coefficient (p value) that equals to 0.480, and the significant which is equal to 0.000. This implies that the higher user satisfaction, the more actual usage of OAIR system. This is similar to prior studies by Alzahrani et al. (2019) and Yakubu & Dasuki (2018).

Behavioral intention was hypothesized to increase Actual usage (AU). This is rejected because the standardization coefficient that equals to 0.79, and the significant which is equal to 0.333. This result contradicts with finding of (Alzahrani et al.,(2019) and Yakubu & Dasuki (2018).

To sum up the above finding imply that great attention should be given by the concerned body towards the quality antecedents as they have strong effect on user satisfaction of OAIR system and which in turn have strong effect on actual usage of the system.

4.7.3. What are the challenges on usage of open access institutional repositories?

The challenges that postgraduate students face while using open access institutional repositories. Form the results obtained, the top three challenges not to be able to find the required material easily, lack of user manual and guideline to use the system and no proper guidance and training program. The majority the respondents, which account for 83.6% have indicated that finding the required material easily was the major problem. Lack of user manual and guideline to use the system has been identified by the respondents as the second problem and this accounts around 78.7%. The final challenge indicated respondents is not having proper guidance and training and this accounts about 75.4%. Other challenges include lack of internet, electric power (43.6%), fear of using new technology (34.4%), lack of background knowledge about the existence of this system (68.9%) and complicated user interface (50.8%).

4.8. Chapter Summery

This chapter presents the results of data analysis based on the quantitative data collected from the survey and the interview. The demographic profiles of respondents towards OAIR system are described based on the constructs derived from the theoretical model. The reliability and validity of the model factors were also checked using the appropriate statistical tool. The linear regression analysis techniques are applied to test the predicting capability of the model and to investigate the research hypotheses. The results of hypotheses testing show that the quality antecedents i.e. system quality, information quality, service quality have a positive impact on user satisfaction, and user satisfaction in turn boosted actual system usage. Information quality and self-efficacy have a positive impact on behavioral intention to use the system. Responses from the interview confirmed that there is a need for continuous improvement on quality antecedents construct to boost the system usage and subsequently user satisfaction.

Chapter Five
Conclusions and Recommendations

5.1. Introduction

This chapter presents the summary of key findings, conclusion drawn from the findings, recommendations forwarded for future research and the limitation of the study.

5.2. Conclusions

This research was aimed to investigate the current level of usage and satisfaction of postgraduate students towards Open access institutional repository system. To archive the main goals of the study an intensive literature review has been done and a conceptual model was developed.

A mixed research approach was employed. Online Questionnaire and phone interview were used to collect data from the respondents. Statistical package for social science (SPSS) was used as data analysis tool. Linear regression analysis was used to analyze the influence factors that affect usage of usage of open access institutional repository. In addition phone interview was conducted to collect the data. Then data was analyzed using deductive thematic analysis method. The reliability and validity of variables in research model have met the minimum threshold value of 0.7. Hypothesis testing was based on the standardized coefficient significant (P value) which should be below the 0.05 level and the standardization coefficient (Beta value) which should be greater than 0.1. So based on the data analyzed the following findings have been obtained.

The result of this study shows that system quality, service quality and information quality significantly predict user satisfaction of the system which in turn have positive impact on actual usage of the system. Only information quality and Self-efficacy has been found to increase behavioral intention to use the system. Then, behavioral intention to use is hypothesized to increase actual usage of the OAIR system. However, behavioral intention to use has no significant influence on actual usage of the system.

Among the different factors that have been described in research framework, the main important factors that affect postgraduate students satisfaction of the system are system quality, service quality and information quality then user satisfaction directly affect the actual usage of the system. So, we can conclude the information that exist on the system, the quality of the system

and the service provided by the university to be the main factors that affect Postgraduate students satisfaction of the system.

The findings of this study demonstrate that the postgraduate students will be satisfied if the output of the system is user friendly, easy to use and visibly attractive to the users. Also, the information provided by the system should be accurate, up-to-date and relevant to the need of the users. Moreover, the postgraduate students are satisfied by the attractiveness, reliability and availability of the system. Some of the challenges that postgraduate students face while using open access institutional repositories includes unable to find the required material easily, lack of user manual to use the system and no proper guidance & training program. This problems will fix by making modification on the system and the organizing right training for the right user in the university.

When we summarize all the above findings, the university management together with the library administration should strive to work to enhance the user satisfaction towards open access institutional repository system. Great attention should be given to the important factors such as system, service and information qualities.

5.3. Recommendation

The following recommendations are forwarded based on the result obtained to increase user satisfaction of the Actual system usage.

The factors of system quality, information quality, service quality have been found to have effect on user satisfaction of the system which in turn affect actual usage of the system. Therefore, great attention should be given to the quality antecedents (system quality, information quality, service quality) as they have strong effect on user satisfaction of OAIR system and which in turn have strong effect on actual usage of the system.

5.3.1 Recommendation for open access institutional system design

Users identified different challenges to use the current system. The following system design modification related recommendation should be considered to improve usability of the system.

- ✓ The system should be integrated with online help/support services and allow users to obtain materials of they are interested in.

- ✓ It would be nice to have a registration form for the postgraduate students and researchers with their respective email and research focus area/interest to continuously notify via their email whenever new and related research work is uploaded to the system this will help postgraduate students to be easily informed about the latest information resources on his/her research interest.
- ✓ The system should include a section that answer the frequently asked questions section and prompt online support.
- ✓ Notify the students and academics to participate in different trainings and orientation programs regarding to institutional repository, subscribed journals and these information should be included in the system to address all students.
- ✓ Detail user requirement study must be done to develop an institutional repository that provide relevant, accurate and complete information to users.
- ✓ The university should undertake user requirement analysis for open access institutional repository training content that will be used as input for training manual development.

5.3.2. Recommendation for Management

The findings of this study indicate the need for the university management need to take different proactive measures to provide timely information and upgrade the system regularly. Based on the findings from this study the following recommendations are made:

- ✓ Regularly updating the information on the institutional repository to increase the availability and accessibility of updated thesis and dissertation by uploading to the repository. On this regard the library management should take a great role.
- ✓ The University managements and Librarians should focus on implementing quality control system since they are experienced at selecting, storing and managing the content.
- ✓ There is a need to enforce open access policy and mandatory submission of thesis and dissertation to university library.
- ✓ The University should pay high attentions on issues like adequate internet access and sustainable power supply in the university.

- ✓ Ensuring adequate and continuous awareness, training programs and user support services to enhance postgraduate students familiarity towards use of open access resources effectively and increase postgraduate students satisfaction during their thesis work to allow them to do better research.
- ✓ The university should assign right personnel to provide services related to the system at the promised time and to help students get the support they need.
- ✓ The university should undertake user requirement analysis for open access institutional repository training content that will be used as input for training manual development
- ✓ The university should create awareness and training program among academics, students and other stockholders on the method of online submission of research outputs directly to the repository.
- ✓ The university library should develop relevant training materials and provide training for users. Although the library provides training, the quality of training is questionable.
- ✓ The university should pay attention to content management of the open access institutional repository since it will enhance the global visibility of their researchers, the institutions and the country at large.
- ✓ Government should release more fund to support conducting research and publications of research outcomes. This will make research finding freely available and accessible.

5.4. Limitation of the Researc0h

Although this study provides a useful starting point for exploring usage of OAIR system by postgraduate students, this study does not come without limitations. The major challenge that the researcher faced while doing this research arises from outbreak of covied-19 or coronavirus pandemic. As students are not easily available in their campus, the researcher forced to change the data collection instrument to online questionnaire and phone interview.

Furthermore, to collect data from all the postgraduate students of AAU University would be impossible. So, other researches take into consideration the views of faculty members, academics and other stakeholders in the university is encouraged. The study is also limited in terms of sample as it only covers AAU, thus the findings from this study should not be generalized to

other universities in Ethiopia. Hence, replicating such study in other Universities would be very good to improve generalization of the findings.

Moreover, the study omitted the net benefit construct proposed by DeLone and McLean (2003) which would have been adapted to explore OAIR usage and satisfaction by postgraduate students, future research should consider the inclusion of this important success factor such as demographic characteristics with the model constructs to determine the actual usage of OAIR by the postgraduate students.

Finally, in the research model, the researchers attempted to measure the effects of positive stimuli such as quality antecedents. Further research should include the effect of negative stimuli towards user satisfaction and actual usage of OAIR system.

5.5. Future work

The potential work for further investigation by other researchers could be outlined as follows:

- ✓ To generalize the results and findings, this study recommends to conduct similar research using Delone and McLean model by including all Ethiopian Universities.
- ✓ In this study system, service, information quality and self-efficacy have been taken as a factor influencing user satisfaction with the system; further studies may look for other factors affecting user satisfaction.
- ✓ This study have been conducted using postgraduate students as the main end user of open access institutional repository; further studies in the future may consider other researchers, academics, administration staff and lecturers.

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Appendix 1

Questionnaire

Questionnaire to be filled by Postgraduate Students of AAU

Dear Sir/ Madam

My name is Hiwot Andargachew, a postgraduate student at Addis Ababa University, School of Information Science. In Partial fulfillment of the program requirement, I am undertaking a research on "**Usage of open access institutional repositories by postgraduate students at AAU**".

I aim at exploring the current level of usage and satisfaction of postgraduate students towards open access institutional repositories in Addis Ababa University. Therefore, I kindly request you to attempt all the questions listed in the questionnaire carefully, as this will help to complete the study successfully.

The information given will be confidential and will be used only for the purpose it has been

collected for. There is no need to write your name. Your assistance will be highly appreciated.

Telephone: +251 923771428

E-mail: Mekdiandargachew@gmail.com

Thank You!

Section A. Demographic information

In this part, the purpose of the study is to understand about your personal information. Please check out using a tick (√) mark to the appropriate corresponding questions.

1. Gender ( ) Male ( ) Female
2. Age (years)

( ) below 25 Years	()26- 30 Years	( )31-35 Years	()36-40 Years	( ) above 40

3. What is your Field of study? _____
4. What is your year of study? ( ) 1st year ( ) 2nd year ( ) 3rd year ( ) 4th + year
5. How would you rate your knowledge of computers and information technologies (IT)?

( ) low	( ) Good	( )Undecided	( )Very Good	( ) Excellent

6. Are you aware of open access institutional repositories (OAIRs)? Yes ( ) No ( )
7. If your answer is "Yes" for question number 6, how long have you used OAIR system? ( ) Less than 1yr ( )1-2 yrs () 3-5 yrs ( ) 6-10 yrs ( ) 10+ yrs
8. Do you have a private computer_____
9. Do you have an Internet connection at home_____

Section B: Problems faced in accessing Open Access Institutional Repository

1. **What challenges have faced regarding using of the Open access IR? (Please specify the degree of problem in the following table)**

Category of challenges	problematic	Somewhat problematic	No problem
Fear of using new technology			
Lack of user manual, guideline to use			
Unable to find the required material easily			
Lack of internet, electric power			

Complicated User interface			
No proper guidance and training			
Lack of background knowledge			
Lack of exposure to use the system			

2. Please write challenges if you have any:
   ……
   ……
   ……
   ……

Section C. Questionnaire related to Information Quality, System Quality, Service Quality, Self- efficacy, User satisfaction, User Intention and Actual Usage.

		Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Information quality(IQ)						
1.	The information provided by the OAIR system is Up-to-date.					
2.	OAIR system provides me accurate and complete information.					

3.	OAIR system provides me relevant information I need.					
4.	The information provided by OAIR system is easy to understand					
System quality(SQ)						
1.	The interface of the OAIR system is attractive.					
2.	I find OAIR system user-friendly and easy to use.					
3.	I find OAIR systems reliable.					
4.	The OAIR systems is available all the time.					
5.	The response time of the system is reasonable.					
Service quality (ServQ)						
1.	I was trained to use the system.					
2.	The user interface of the system has a well-organized appearance					
3.	The responsible body is willing to help whenever I need support while the system					
4.	The responsible service personnel provide services related to the system at the promised time.					
User satisfaction(US)						
1.	I am satisfied with the performance of OAIR system					
2.	Use of OAIR is an enjoyable experience.					
3.	I am satisfied with effectiveness and efficiency of OAIR system.					

4.	I feel satisfied with the quality of information provided by the OAIR system.					
Actual Usage(AU)						
1.	I use OAIR frequently					
2.	I use many of the function in OAIR system					
3.	I spent a lot of time using the system					
Self-efficacy (SE)						
1.	I have a basic knowledge on how to use OAIR system.					
2.	I use OAIR system if someone else has showed me how to do it first.					
3.	The university offers training programs regarding OAIR system					
4.	I advise my colleagues to use the OAIR system continuously					
Behavioral Intention to use(BI)						
1.	The system helps me to get what I need.					
2.	I intend to use OAIR system frequently					
3.	I will to recommend other people to use the system					
4.	I am very likely to use the system in the future					

Please feel free to give any other comments and suggestions.

_____
_____
_____
_____
_____
_____
_____

The End

Appendix 2

Interview Checklist for postgraduate students

1. What is your general feeling regarding the quality of the OAIR system?
2. What would be your comment regarding the quality of information you get from open access institutional repository system?
3. How available are the OAIR system services for you? How do you describe the quality of service provided by the OAIR system?
4. Does the quality of information affect your frequency of using the OAIR system?
5. In what ways do you feel the quality of information fails to meet your expectation?
6. What discourages you from using the OAIR system?
7. What are the factors that affect the usability of the system related to IT infrastructure?
8. Would you please mention if you participated in training in the university regarding to OAIR system usage? If yes, how do you evaluate the effectiveness of the training?
9. Would you please mention from where did you hear about the training?
10. What is your experience with the quality of support services offered for of the OAIR system?

Appendix 3

Interview Checklist for System Administrators (OAIR Administrators)

1. Does the system provide up-to-date information for the users?
2. How do you evaluate the current practice of the system in the university?
3. Do you believe that the students use OAIR system continuously to perform their research activities in the university?
4. Do you have any mechanism to check the system running without problems?
5. Do you have any formal training program that given to post graduate students to use the system?
6. How do you measure the user's satisfaction of users?
7. What are the challenges that discourage the postgraduate students to use open access institutional repository?

Appendix 4

Full List of Subscribed Journals

1. **African Journals Online (AJOL)**

Tables of contents and abstracts of over 430 African journals with 90% of articles having their full text available for download.

2. **Access to Global Online Research in Agriculture (AGORA)**

The AGORA program, set up by the Food and Agriculture Organization of the UN (FAO) together with major publishers, enables developing countries to gain access to an outstanding digital library collection in the fields of food, agriculture, environmental science and related social sciences. AGORA provides a collection of up to 6,100 key journals and 5,800 books to 2,900 institutions in more than 100 countries. AGORA is designed to enhance the scholarship of the many thousands of students, faculty and researchers in agriculture and life sciences in the developing world. AGORA is one of the four programs that make up Research4Life: AGORA, HINARI, OARE and ARDI.

3. **American Astronomical Society**

The Society publishes three scholarly journals that are available through PERI: The Astronomical Journal, The Astrophysical Journal (including The Astrophysical Journal Letters), and The Astrophysical Journal Supplement Series.

4. **American Chemical Society**

The American Chemical Society is the leading publisher of peer-reviewed research journals in the chemical and related sciences, serving scientific communities worldwide through an unparalleled commitment to quality, reliability, and innovation. Access is to over 35 high quality, high impact journals.

5. **American Institute of Physics**

AIP publishes 12 journals, 2 magazines, and a conference proceedings series. AIP's citation platform hosts over 2 million articles from more than 200 scholarly publications for 28 earned society publisher.

6. **American Physical Society APS**

Access to the Physical Review Online Archive (PROLA) and journals produced by the American Physical Society.

7. **American Society of Agricultural and Biological Engineers (ASABE)**

ASABE Technical Library includes a range of content including journals, textbook materials, monographs, standards and proceedings as well as the important reference work-in-progress, Design Topics.

8. **American Society of Civil Engineers**

ASCE Journals Online provides unprecedented access to 32 journals encompassing more than 48,000 full-text papers published since 1983 – that's over 408,000 pages! Approximately 4000 new papers will be added each year.

9. **Annual Reviews**

Annual Reviews publications operate as a high quality filter, prioritizing and synthesizing the primary research literature in 37 different disciplines for the Biomedical, Life, Physical and Social Sciences. The authoritative and comprehensive review articles are written by leading scholars who are dedicated to helping scientists, students and researchers around the world prioritize and navigate the vast amount of primary research literature and data that is available to them. Year after year, Annual Reviews publications earn the highest Impact Factors according to the ISIÂ® Journal Citation Reports (JCRÂ®).

10. Brill

Brill is an important publisher of journals, with nearly 200 titles in various subject fields. Nearly all our titles are available in print and online formats. Our E-Journals are available through our new platform booksandjournals.brillonline.com.

11. B**ritish Institute of Radiology**

The BIR is developing a specialized online collection to support study, continuous professional development and research. You will find resources for: **Medical Images** including Primal Pictures–interactive 3D images and other resources for medical images. **Databases** include MEDLINE with access to some full text articles for medical journals and CINAHL Plus with access to some full text articles for nursing and allied health journals.

12. **Cambridge University Press Journals Online (CJO)**

Over 230 leading titles in Linguistics, Politics, Medicine, Science, Technology, Social Science and Humanities.

13. **Canadian Science Publishing (was NRC Press)**

Canadian Science Publishing is an independent, not-for-profit scholarly publisher dedicated to serving the needs of researchers and their communities. Our goal is to be an innovative leader in scholarly publishing in Canada and around the world.

14. **Cochrane Library (Web)**

The Cochrane Library (ISSN 1465-1858) is a collection of six databases that contain different types of high-quality, independent evidence to inform healthcare decision-making, and a seventh database that provides information about Cochrane groups.

15. **De Gruyter Online Journals (inc LIS)**

De Gruyter's subject areas cover pretty much every field that a researcher could possibly work in ranging from ancient studies to linguistics, and from mathematics to cytology. Today, the De Gruyter group publishes over 1,300 new titles each year in the humanities, social sciences, STM and law, more than 700 subscription based or Open Access journals, and a variety of digital products.

16. **Duke University Press**

Duke University Press is an academic publisher of books and journals, and a unit of Duke University. It publishes approximately 120 books annually and more than 40 academic journals, as well as five electronic collections. The company publishes primarily in the humanities and social sciences but is also particularly well known for its mathematics journals.

17. **EBSCO EconLit**

EconLit with Full Text contains all of the indexing available in EconLit, plus full text for more than 480 journals, including the American Economic Association journals with no embargo (American Economic Review, Journal of Economic Literature, and Journal of Economic Perspectives. This database also contains many non-English full-text journals in economics & finance.

18. **EBSCO Host Research Databases**

Over 11,000 full text, peer-reviewed journals and over 15,000 abstracted and indexed titles. Access to 8 major databases: Academic Search Premier; Business Source Premier; ERIC; Masterfile Premier; Newspaper Source; Health Source : Nursing & Academic; Health Source : Consumer Edition; Medline.

19. EBSCO Medline with full text upgrade

This database provides full-text for many of the most-used biomedical and health journals indexed in *MEDLINE.* Many journals are available with no embargo, allowing doctors, nurses, health professionals and researchers to access to the information as soon as it is published.

20. **EBSCO NISC**

EBSCO NISC, through PERii provides access to the four databases all with relevance to Africa.

21. **Edinburgh University Press**

Edinburgh University Press publishes over 30 journals across a range of disciplines in the humanities and social sciences.

22. **Emerald Insight**

Emerald Publishing was founded in 1967 to champion new ideas that would advance the research and practice of business and management. Today, we continue to nurture fresh thinking in applied fields where we feel we can make a real difference, now also including health and social care, education and engineering. Emerald manages a portfolio of nearly 300 journals, more than 2,500 books and over 1,500 teaching cases.

23. **Gale Cengage Learning: Expanded Academic Resource Center**

Expanded Academic: Unparalleled in its depth and scope, this premier database offers balanced coverage of every academic subject — from advertising and microbiology to history and women's studies.

24. **Gale Cengage Learning: Health & Wellness Resource Center**

Health and Wellness Resource Center: For access to authoritative health and medical information, turn to the Health & Wellness Resource Center, a specialized reference tool that offers a vast collection of medical information to academic, medical and public libraries.

25. **Geological Society**

The Lyell Collection is an electronic resource containing new and archival journal, Special Publication and book content, published by the Geological Society of London. It contains key peer-reviewed Earth science literature of the highest quality.

26. **Greenleaf Online Library (GOL)**

The Greenleaf Online Library (GOL) is the full archive of material published by Greenleaf Publishing, including books, case collections and journals. Each chapter or article is individually tagged with its own metadata.

27. **GSE Research & Greenleaf Publishing: Sustainable Organization Library (SOL)**

The **Sustainable Organization Library (SOL)** contains more than 10,000 individually searchable chapters, case studies and journal papers drawn from more than 800 book and journal volumes, published by the leading independent sustainability publisher, Greenleaf Publishing, and a number of partner organizations.

28. **Henry Stewart Talks Ltd (HSTalks)**

Henry Stewart Talks Ltd (HSTalks) is a leading provider of specially prepared, animated, online, audio-visual lectures, seminar-style talks and case studies for medical schools, business schools universities and commercial enterprises in over 60 countries around the world. Based in London, UK, HSTalks publishes two highly regarded collections (The Biomedical & Life Sciences Collection and The Business & Management Collection). They are both available on annual subscription with licenses granting unlimited access 24 hours a day every day of the year.

29. **Hinari Access to Research for Health program**

Hinari Program set up by WHO together with major publishers, enables low- and middle- income countries to gain access to one of the world's largest collections of biomedical and health literature. Up to 15,000 journals (in 30 different languages), up to 47,000 e-books, up to 100 other information resources are now available to health institutions in more than 100 countries, areas and territories benefiting many

thousands of health workers and researchers, and in turn, contributing to improve world health.

30. **HST – Libraries in a Digital Age**

The collection contains over 2,000 specially prepared, animated, online, audio-visual lectures by world leading authorities including Nobel Laureates. It is highly regarded by faculty, post-docs and other research staff, graduate students and advanced undergraduates. It is constantly updated and extended. All lectures are suitable for inclusion in courses and as additional learning material including in blended learning and flipped classroom programs, and may be included in Moodle, Blackboard and other Online Learning Environments.

31. **Institute for Operations Research and the Management Sciences (INFORMS)**

INFORMS publishes 12 scholarly journals, including a journal for the practice of OR/MS (Interfaces), as well as an on-line open access journal (INFORMS Transactions on Education).

32. **Institution of Engineering and Technology (IET) Digital Library**

Over 20 Research journals and letters in electrical and electronic engineering.

33. **Institute of Physics(IOP) Publishing**

IOP publishes over 60 of the world's most prestigious journals in physics and related sciences, all available online through IOP publishing.

34. **International Forestry Review**

The International Forestry Review is a peer-reviewed scientific journal that publishes papers, research notes and book reviews on all aspects of forestry and forest research. It is published four times per year. Themed editions are a regular feature and attract a wide audience.

35. **JSTOR**

JSTOR is a not-for-profit organization dedicated to helping the scholarly community discover, use, and build upon a wide range of intellectual content in a trusted digital archive. Our overarching aims are to preserve a record of scholarship for posterity and to advance research and teaching in cost-effective ways. We operate a research platform that deploys information technology and tools to increase productivity and facilitate new forms of scholarship. We collaborate with organizations that can help us achieve our objectives and maximize the benefits for the scholarly community.

36. **Liebert Online**

Publishing integrated media content in the most promising areas of biotechnology, biomedical research, clinical medicine and surgery, engineering and technology, environmental studies and policy, law and economics, and public health.

37. **Liverpool University Press**

Liverpool University Press (LUP) is a UK academic publisher of books and journals in the arts & humanities — literature, languages, history and visual culture.

38. **Nature Publishing Group**

Nature Publishing Group (NPG) publishes journals and online databases across the life, physical and applied sciences and, most recently, clinical medicine. Content encompasses daily news from award-winning journalists, expert opinion and practical methodology, and more high impact research and reviews than any science publisher. Over 30 journals are published in association with prestigious academic societies.

39. **Optical Society of America (OSA)**

Founded in 1916, The Optical Society (OSA) is the leading professional association in optics and photonics, home to accomplished science, engineering, and business leaders from all over the world.

40. **Oxford Journals (OUP)**

Oxford Journals publishes journals from science, technical, professional, medical, humanities, arts and social science disciplines. Organizations that qualify for the free Developing Countries Oxford Online Collection offer will obtain access to over 200 titles.

41. **Policy Press Journals**

The Policy Press publishes four highly prestigious journals in the fields of public and social policy. Policy Press is a leading specialist social science publisher committed to journals that will have an impact on research, learning, policy and practice at an international level.

42. **Project MUSE**

Project MUSE provides online access to almost 500 full-text journals from 140 non-profit publishers in the humanities and social sciences.

43. **Royal College of Physicians**

Clinical Medicine journal is read by leading physicians in hospitals across the world. It features articles covering original research, current issues, ethics, law, clinical governance and audit, and also reports on prestigious College lectures and conferences.

44. **Royal Society**

Seven leading international journals from the Royal Society, the UK's national academy of science. Titles cover the whole of the biological and physical sciences, and include Philosophical Transactions of the Royal Society, the longest-running continuously published journal in the world.

45. **Royal Society of Chemistry: RSC Journals Archive**

Back file containing all articles published by the RSC (and its forerunner societies) from 1841 to 2004.

46. **The Royal Society of Medicine Journals Collection**

The Royal Society of Medicine Journals, published by SAGE, range in scope from primary research to clinical practice, covering topics from experimental medicine to venous disease. The flagship Journal of the Royal Society of Medicine (JRSM) is one of the most widely read and enjoyed general medical periodicals, providing insight into a broad spectrum of issues facing medical professionals.

47. **Sage Publications**

Over 550 journals in the business, humanities, social sciences and STM.

48. **Sage Publications – IMechE (was PEP)**

18 journals representing the best in mechanical engineering. Also available is the IMechE Proceedings Archive 1847-1996.

49. **SPIE Digital Library**

The SPIE (Society of Photo-Optical Instrumentation Engineers) Digital Library is the most extensive resource available on optics and photonics, providing unprecedented access to more than 270,000 technical papers from SPIE Journals and Conference Proceedings from 1990 to the present. More than 17,000 new technical papers are added annually.

50. **SPringer Lecture Notes Series**

The Springer series Lecture Notes in Computer Science (LNCS), includes its subseries Lecture Notes in Artificial Intelligence (LNAI) and Lecture Notes in Bioinformatics (LNBI). The series publishes new developments in computer science and information technology research and teaching – quickly, informally, and at a high level.

51. **Society for Industrial and Applied Mathematics**

SIAM exists to ensure the strongest interactions between mathematics and other scientific and technological communities through membership activities, publication of journals and books, and conferences.

52. **Taylor & Francis Online Journals**

More than 1,300 titles in humanities, social sciences and applied sciences.

53. **University of Chicago Press**

The University of Chicago Press publishes nearly fifty scholarly journals, many on behalf of some of the world's most prestigious societies, and several that were the first scholarly publications in their respective fields. The journals present original research in the social sciences, humanities, education, and biological and physical sciences.

54. **Wiley Online Library (formerly Inter Science)**

Wiley InterScience® is a leading international resource for scientific, technical, medical and scholarly content providing access to millions of articles across a wide range of journals. This package provides access to over 350 journals.

55. **Wiley Online Library (formerly Synergy)**

Access to over 840 leading learned journals in science, technology, medicine, humanities and social sciences.

56. **World Bank e-library**

The World Bank e-Library is an electronic portal to the World Bank's full-text collection of books, reports/working papers, journals and other documents on social and economic development. It is the most comprehensive collections in the area and it brings together, in PDF format, a fully indexed and cross-searchable database of 6,000+ titles, as well as every new title as it becomes available in print. In addition, subscribers have access to information not available in print. E-Library is fully searchable by subject, region, keyword, title, author, abstract, or year of publication.

57. **World Bank Global Development Finance (GDF) Database**

Global Development Finance (GDF) Online offers external debt and financial flow data for over 129 countries that report public and publicly guaranteed debt to the World Bank's Debtor Reporting System. Time series includes over 200 indicators from 1970 through 2017. The database covers external debt stocks and flows, major economic aggregates, and key debt ratios as well as average terms of new commitments, currency composition of long-term debt, debt restructuring, and scheduled debt service projections.

58. **World Bank World Development Indicators (WDI) Online Database**

World Development Indicators (WDI) Online is the premier data source on the global economy. It contains statistical data for 854 development indicators and time series data from 1960 for over 200 countries and 18 country groups.

59. **World Bank – Global Economic Monitor**

Conceived by the World Bank team responsible for monitoring and reporting on day-today developments in the global economy, Global Economic Monitor is a "one-stop shop" portal for analysis of current economic trends, and economic and financial indicators. Global Economic Monitor features up-to-date analysis on

global economic conditions, including a daily brief and event-driven focus reports, direct access to high-frequency datasets via Quick Query, forecasts for commodity prices and main macroeconomic indicators for over 130 countries.

60. **World Bank: Africa Development Indicators**

Africa Development Indicators provides the most comprehensive collection of data on Africa available. It contains data for over 1,400 statistical indicators and time series from 1965 for 53 countries. Data include social, economic, financial, natural resources, infrastructure, governance, partnership, and environmental indicators.

Appendix 5

Visited open access institutional repositories

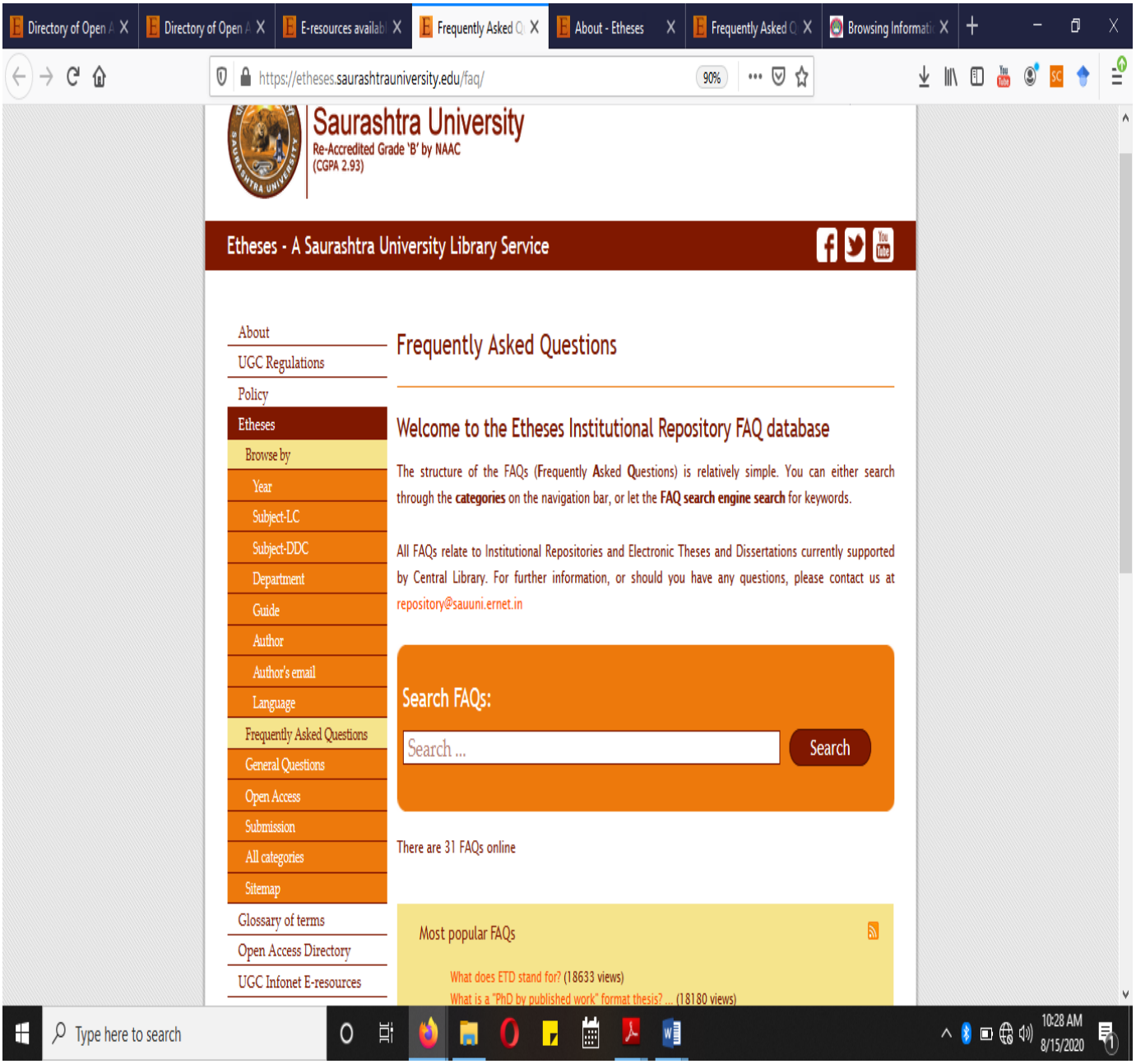

Figure 5 Saurashtra University Directory of Open Access Repositories in India