UNIVERSITY OF NAIROBI

AN ANALYSIS OF THE USAGE OF A DIGITAL REPOSITORY IN AN ACADEMIC INSTITUTION

By

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This research project is submitted to the School of Computing and Informatics – The University of Nairobi in partial fulfilment of the requirements for the award of the degree of Master of Science in Information Technology Management (MSc. ITM)

DECLARATION

Student Declaration

I JANE ACHIENG, whose student registration number is **P54/79964/2015**

hereby declare that this MSc. Project entitled ANALYSIS OF THE USAGE OF A DIGITAL REPOSITORY IN AN ACADEMIC INSTITUTION to the best of my knowledge and belief is my original work and has not been submitted for examination in this university or other universities for an award of any other degree. Any uses made within it of the works of other authors in any form are properly acknowledged at the point of their use and a full list of the references employed has been included at the last pages.

Signature:…… Date:……

Name: JANE ACHIENG

P54/79964/2015

Supervisor's Declaration

This research has been submitted for review with my approval as a university supervisor.

Signature:…….

Date:……

Name: DR. AGNESS WAUSI

SCHOOL OF COMPUTING & INFORMATICS

UNIVERSITY OF NAIROBI

DEDICATION

Completely to God for this far he has brought me. Also to my late Dad and Mum whose life I was able to draw strength from to finish this race even at so late a stage in my life

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My sincere appreciation goes to Dr. AGNESS WAUSI for her guidance during the entire period of this research and without her valuable contribution; this work would not have come to completion.

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ABSTRACT

The problem

The ever evolving Internet platform and technological advancements in the area of information management offers innovative ways to information managers to use in the acquisition, storage, management and dissemination process of information. To this end, Institutions of higher learning libraries are always on the lookout to adopt new tools to improve their services to the users. Digital repositories are the new platform that libraries are adopting as additional digital resources and services on their portals. This requires additional investments towards the full creation and implementation of the institutional repositories.

The assumption is that users are aware of the e-resources and will use it incrementally leading to increased usage of the resources. Efficient and effective services lead to satisfied users. In turn, this drives more users to the system that links to increased overall visibility of the organization on the Internet. This justifies the cost and payoff on the system. On the other hand, when users are not aware of the system and the system does not work for them, the users are put off and look for alternative service providers or other ways of getting information.

Institutional repositories also known as digital libraries serve to provide services that support users in their tasks. This study investigates the usage of the digital resources and repository system in an academic institution of higher learning.

The purpose

The purpose of this research is to investigate the usage of the digital resources by the various user groups in the University of Nairobi with a specific focus on the digital repository. It analyses the usage of the digital repository from the user perspective of effectiveness, efficiency, satisfaction, and awareness construct. Ultimately, it will find out the extent to which the users are utilizing the resources, barriers that exist and the options that exist to help increase usage.

Methodology:

The study engaged 200 users of the system. It is a mixed research that used both qualitative and quantitative data. 200 students from two different user groups, the undergraduate and postgraduate students from two colleges; College of Biological and Physical Sciences and College of Humanities of the University of Nairobi were selected for this study. Probability sampling was used to select the respondents. Empirical data was used to investigate the usage of the digital resources from effectiveness, efficiency, awareness, usefulness, and usability perspective. Subjective measures are based on questionnaires that have 5 point Likert type questions that rate the statements to get their responses. Open ended questions have also been integrated.

Findings:

The research found underutilization of the e-resources, lack of access to computers and resources and infrequent utilization of many products and services on the library portal. The research revealed that independent variables effectiveness, efficiency, satisfaction and awareness contribute to usage of the digital repository and e-resources. Each of these factors influences the usage either positively or negatively. The usage drivers were identified as lack of awareness and information, satisfaction and frequency of use, increased information needs, and reduction of barriers to access. The research revealed that the effectiveness, efficiency, satisfaction and awareness construct have positive impact on the usage of the repository and the e-resources and can be used to increase usage of a digital repository. The findings will be useful to the University of Nairobi and similar institution which are adapting e-repositories.

(Keywords: Digital repositories-Kenya-Africa, System usability evaluation, IT usage research, E-resources usage, Digital repository analysis)

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LIST OF ACRONYMS AND ABREVIATIONS

IHL – Institutions of Higher Learning

ICTs – Information Communication Technologies

IS – Information Systems

ANOVA - Analysis of Variance

TAM - Technology Acceptance Model

CHAPTER ONE

INTRODUCTION

The ever evolving Internet platform and technological advancements in the area of information management offers innovative ways to information managers to use in the acquisition, storage, management and dissemination process of information. To this end, university libraries are always on the lookout to adopting the new tools to improve their services to the users. Digital repositories are the new platform that libraries are adopting as an additional digital resources and services on their portals. This requires additional investments and increase in resources towards the full creation and implementation of the institutional repositories.

Institutional repositories also known as digital libraries serve to provide services that support users in their tasks and they involve interacting with the systems and interaction behavior. The components of import in the scenario of such services include users, the presented content as well as the system on which they are performed.

The latest innovations for academic institutions and resources centers in the area of information are the digital information resources. Digital Information resources have been defined by Bhattacharya, U. (2007) as information bearing material in digital form and it includes databases both local and remote, CDs and DVDs, and electronic publications that include e-journals, e-books and the Web resources.

Many academic institutions worldwide have adopted e-resources as important infrastructures in improved service provision for their users. Included and of special focus in this study are digital libraries or repositories defined as "organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and

economically available for use by a defined community or set of communities", Digital Library Federation (1999).

In the same manner that Libraries became hallmarks of a university, Digital repositories are stamping their existence in many academic and research institutions. It seem that it is a 'must have' in universities and research institutions. In a survey of 1152 respondents in the information world about digital repositories, 70% had established and implemented digital repositories while 22 indicated their intention to implement.

It is then a reality that digital repositories can only increase in number in as many felt that the importance of repositories was on the increase. In Africa, digital repositories will certainly increase in the universities as they are tied to webometric ranking that help increase the research visibility of African universities.

The University of Nairobi Library digital repository started as a project in the ICT department of the University of Nairobi. It migrated to the library. It was to become critical when Webometric**s** ranking of universities became important offering the potential to increase the online presence of the University and their research visibility. The University management began to pay close attention to how their websites and the digital repository were being managed availing resources both human and financial to boost the**se** activities. As the repository grew, the University of Nairobi ranking improved considerabl**y**. Initially, the repository had been holding some research output of the University academic community and the abstracts of the thesis and projects of the students. Recently, a decision was made to upload complete documents on the repository as it became increasingly clear that users were not finding satisfaction in accessing abstracts without the full documents.

Investments in such infrastructures require that organizations link to the users to find out how they have accepted and adapted to the new systems. Interest in usage has increased over time as a key dependant variable in IT research. As IT becomes more pervasive, understanding usage and its determinants is critical in "effective deployment of IT resources in an organization. Optimum usage is a necessary

condition for ensuring productivity payoffs from IT investments", (Davies 1989, Mathieson, 1991).

The University of Nairobi Digital Repository runs on DSpace (2), an open access proprietary software that is not only useful for archiving and disseminating research-related documents but offers excellent utility features such as reuse, metadata storage that are in tandem with requirements for modern repository usage.

Wherefore, traditional studies focused on assessing the value of information technology to the organization and the determinants of that value with the objective of helping firms to "better deploy and manage their IT resources and enhance overall effectiveness", Several approaches have been used to address this problem. Of interest to this study is the approach to examine the determinants of IT adoption usage by individual users as advanced by Davies, (1989) and Davies et al, (1989). The forerunners of this thinking were Delone and Mclean (1992) who focused on the examination of usage as a surrogate measure for information systems success.

Overarching theories to understand usage and its corresponding determinants are found in intention based models which use behavioral intentions to predict usage and focus on the identification of determinants of intentions such as attitudes, social influences and facilitating conditions, (Todd, and Shirley, 2003).

The other concept in such a study would be usability. Usability studies evolve around user centered approach where the user is at the centre of the development process and is foremost in the design decisions. ISO 9241-11: Guidance on Usability (1998), defines usability as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" Usability tests and studies will help to satisfy the user to achieve their goals, to enjoy their experience and invite others to do the same and they show the areas to improve in efficiency, effectiveness and satisfaction and overall give returns on investments.

Usability being a multi dimensional construct, it has theoretical basis on human computer interaction and "can be examined from various perspectives such as interface effectiveness point of view", Jeng, J. (2005). The general framework for

usability has the 4 components which is user, task, system and environment and a good product is one that can connect to the four components in a harmonious manner. Therefore, usability can be defined in terms of interaction between user, task and system in the environment.

Nielsen, (1993, p. 24) argued that a system is acceptable only if the focus is mainly on the attributes which constitute usability. Arguing that usability is a narrow concern compared to the larger issue of system acceptability, it emphasizes that a system is acceptable if and if only it is good enough to satisfy all the needs and requirements of the users. And therefore system performance is a determinant factor for user acceptance of a system (Tsakonas & Papatheodorou, 2005, p. 403). And the overall acceptability of a computer system is a combination of its social acceptability and its practical acceptability.

Burton –Jones and Straub, 2006, took a different path on system usage and how it should be studied. They tried to inform usage from a different perspective where they call for researchers to review the definition and the approach to the methods employed in research on system usage. They offered a better approach done in two steps or stages. In the first stage, the researcher defines the characteristics and states the assumption regarding the characteristics. The second stage is the selection stage where the researcher chooses the best measures for the part of the usage activity that is of interest. They explained system usage as an activity that involves 3 elements of a) user – subject using the IS; b) system – the object being used and c) the task- functions being performed.

Techniques of evaluating system usage for academic sites are listed by Jeng, J (2003), p100. The list includes "formal usability testing, usability inspection, card sort, category membership expectation, focus groups, questionnaires, think aloud, analysis of site usage logs, cognitive walkthrough, heuristic evaluation, claims analysis, concept based analysis of surface and structural misfits (CASSM), paper prototyping and field study" (Askin, 2009 pg 99).

Across time, the main problem areas of usability studies have been in coverage, navigation, functionality, utility, interface, metadata appropriateness and awareness of library resources. Blandford, (2006) took note that various authors have pointed out that usability evaluation for academic digital libraries has not received as much attention. Even then, gaps in areas of usability studies have been identified as lack of methods for analyzing usability, appropriate techniques, balancing rigor as well as lack of supporting literature on usability testing on library websites.

This study will apply the method to evaluate usage and usability of the digital library of the University of Nairobi using questionnaires. It will cover the area of awareness of library resources and usability components of effectiveness, efficiency and satisfaction as well as barriers to access and usage of the e-resources.

1. 1 STATEMENT OF THE PROBLEM

Digital information resources have carved an important place in academic institutions who offer information materials and services online to reach their expanding user base wherever they are. The services range from e-resources to digital libraries and include social media such as face book and twitter.

Many challenges exist in the Digital resources and digital repositories which are in the library domain. They range from technical, legal, organizational as well as usage problems. One of the critical challenges is to understand the issues that confront users in dealing with or using the digital libraries.

These issues have become critical research areas in recent years. Research on usage is important to determine and find out if the various user groups are on board and are able to utilize products and services on the digital platform of an institution and if the usage is optimum among the communities for which it is intended. Research on usage interrogates existing barriers and helps give insight into the relationship between effectiveness, efficiency and satisfaction on important user criteria. The answers from such a study sets a suitable basis for appropriating the right strategic approach towards enhancing access to the information in a repository and overall contribution to the objectives of the organization in its quest for maximum online visibility.

1.2 RESEARCH OBJECTIVES

The main objective of this research is to analyze the usage of the digital resources and digital repository by the users of the University of Nairobi Community.

The specific objectives are;

1. To investigate the drivers and barriers to the digital repository usage in Academic institutions
2. To establish the effect of e-resources efficiency on the usage of digital resources by students in the University of Nairobi.
3. To find out how e-resources effectiveness affects usage of digital repository.
4. To determine how user satisfaction with the e-resources affects usage of digital resources by students in the University of Nairobi.
5. To find out the effect of e-resources awareness on the usage of digital resources by students in the University of Nairobi.

1.3 JUSTIFICATION OF THE STUDY

Research in usage of information systems are increasing over the years because they have become important in offering insight into the user's acceptability and response to the systems which the organization has invested a lot of resource in thus helping to determine the productivity pay-off. This study follows this path in the desire to give insight into how the users of the e-resources and the digital repository have accepted and are utilizing the system and the problems or barriers they may be facing that hinders their usage. No such study has been done on determination of usage of e-resources in the University of Nairobi and none has been carried out on usage on the digital repository in this country. Digital repositories are just beginning to be an important feature of information management in the country and it is envisaged that it will offer a starting point for future and further studies.

1.4 SIGNIFICANCE OF THE STUDY

After the results have been analyzed, conclusions will be made. These conclusions will be significant to the, Library Management, the University management and the university community at large on several issues;

1. It will inform the library management on the extent to which the digital resources on the libraries digital platforms is being utilized in the university by the various user groups.
2. The existing barriers to accessing these resources by the different user groups.
3. The effect of core parameters of usage namely effectiveness, efficiency, satisfaction and awareness on the usage of the digital repository in the institution.
4. The recommendations will help to address the usage gaps highlighted. It is envisaged that strategies can be developed to help increase the usage of the repository among the university communities which in turn will increase research uptake and overall online visibility of the University of Nairobi.
5. The study results would offer useful insight and recommendations to creators and managers of future digital repositories being set up in the country at large and to the new area of knowledge in Kenya.

1.5 SCOPE OF THE STUDY

The University where the study is done has close to 70,000 students spread across the various cities and towns in Kenya.

- The research sample was drawn from the Nairobi University main campus in Nairobi which hosts the college of Humanities and social sciences, the Chiromo campus which has the College of biological and physical sciences and the School of Law, in Parklands campus.
- The e-resources are online and accessible online worldwide by all the students based in all the campuses, researchers and academic staff of the university of Nairobi wherever they maybe.

- The research study will assess usage from the user perspectives and these user groups are undergraduate students, Master students, Phd students and researchers as well as the teaching and academic staff of the University of Nairobi.
- The sample size is 384 users of the e-resources.

1.6 LIMITATIONS OF THE STUDY

The actual users of the e-resources are all the university students, lecturers and academic staff who total to close to 70,000 users based countrywide and worldwide.

1. The study was limited to only 384 respondents. Eventually, only 200 respondents among two users groups – undergraduates and postgraduates were included in this particular study.
2. It was conducted in the month of July, August and September, 2016.

The sampling plan was to derive a representative sample from all the four user groups but this was not the case and eventually only two user groups was used and the sample size that responded was 100 users among the undergraduate and 100 among the postgraduate students. Eventually, the questionnaires for the two user groups, the academic staff and PhD students were not included in the analysis.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter presents literature review of the study. The review is set out under various topics starting with the introduction, definitions, theoretical review, evaluation frameworks and the empirical evidence that informs the study.

2.2 THEORETICAL REVIEW

An excellent starting point in helping to clarify the relationship between various aspects in studying the relationship between systems acceptance and impediments is the Technology acceptance model (TAM), Davis, (1991). The model specifies the relationships between systems design features, perceived usefulness, perceived ease of use, attitude toward using and actual usage behavior. The choice of design influence user acceptance and is useful in forecasting and evaluating user acceptance and information technology. When users do not accept a system, its success is in jeopardy. Stating that the goal of any system is to improve performance on the job, user acceptance is therefore a pivotal factor to determine success or failure of an information system project.

Usefulness as a determinant of a system is an important concept which was advanced by tests that were done to replicate the work of Davis, (1989) to test the validity of the ease of use and usefulness scales. The study done by Todd et.al, found out the following; that there is no absolute measure of ease of use or usefulness; that user perceptions of these constructs may vary with time and experience for any given applications; that the relationships between constructs to usage is complex than typically postulated; and that tasks and user characteristics may mediate the relationship between ease of use and usage and usage may influence perceptions of ease of use.

However, the concepts of usability when applied to digital repositories context, means “how easy and effective users can find information through interactions with

digital library interface", Gibb (2006). The works of Tzang *et a*l (2011) contains the concepts and metrics that are specific to the digital repositories.

Judy Jeng (2005a, 2005b), reviewed the definitions of usability and the applicable model in the context of repositories which is of great value in this context. She gave four integrated dimensions as effectiveness, efficiency, satisfaction, learn ability for evaluation while Buchanan and Adeola Salako (2009) , Giannis Tsakonis and Christos Papatheodorou (2008), Nadjla Harir and Yaghoub Nourozi (2011) contributed the following effectiveness, efficiency, aesthetic appearance, navigation, terminology, learn ability, compatibility, visibility, system use, experience, flexibility, access, ease of use, match between systems, customization, user support, user workload, interaction as well as ease of contributing research materials to the repositories. Indeed, Karoulis and Pombortsis (2003) examined the thought that usability constructs of effectiveness, efficiency and satisfaction as well as learn ability of educational environment *are positively correlated*. And this lead to usability being categorized in terms of inherent usability which are those features that are about functionality and attributes that focus on how to make the product "easy to understand, easy to learn, efficient to use, less erroneous" and pleasant while apparent usability relates to the visual impression of the interface.

The methodologies to be used in evaluating information systems adaptation is largely informed by the groundwork of Davis (1989). He developed valid measurement scales for predicting user acceptance of computers. Using 153 users and regression analysis, he developed and validated new scales for two specific variables perceived usefulness (PU) and perceived ease of use (PEU). Later on a study of 18 respondents' from10 different organizations was carried out by Venkatesh, V., Davis, F.D (2000). They surveyed attitude toward two messaging technologies: voice and electronic mail.

Using structural equation modeling, the two studies on the subject of perceived usefulness ease of use, and usage of information technology, focused on evaluating the psychometric properties of the ease of use and usefulness scales, while examining the relationship between ease of use, usefulness, and system usage.

Other studies that compared and evaluated the technology acceptance model and two variations of the theory of planned behavior to asses which model best helps to understand usage of information technology offered the result that the decomposed theory of planned behavior gives a fuller understanding of the behavioral intention because it focuses on factors that are likely to influence systems use through the application of both design and implementation strategies.

An interesting perspective to all the theories advanced by the doyen of systems usage as discussed above must take on Burton –Jones and Straub, (2006) new arguments. They took a different path on system usage and in their paper "*re-conceptualizing system usage; An approach and empirical test*.", they challenged the traditional definition of system usage in the IS field arguing that there had been no general acceptance of any definition, they called for a two stage approach that requires the researcher to focus attention in their vested areas of interest to which the system is used.

In their measurement scale, they advocated for lean and rich measures of system usage where lean measures reflect usage alone, rich measures reflect its nature involving the system user and task. Interrogating system usage studies across time, they classed Alevi and Henderson studies of 1981 as being very lean, Venkatesh and Davis, (2000), as lean and Saga and Zmund, (1994) as somewhat rich IS. Agarwal and Karahanna involving both IS and user was classed as rich and Igbaria et al, (1997) as rich IS and task. They concluded that the very rich involving IS, user and task has not been done yet and is very difficult to capture.

In their view, it meant that "individual level system usage is an individual user employment of one or more features of a system to perform a task". Thus, their definition separates system usage from related distinct constructs. They proffer system usage as being distinct from information usage and that information is a useful construct but is not identical to system usage as well as also being quite distinct from users decision to use or subsequent dependence on an IS from user adoption. They stressed that even though many researches has utilized such

constructs as proxies for system usage, proxies should not be confused for constructs.

Another interesting thought they fronted is that system usage is not an evaluation. They stressed that evaluating quality of use and appropriate use, (Aur 1998, Chin et al. 1997) are useful constructs but do not measure system usage. That these measures are actually measures of the degree to which one's usage corresponds with and not a construct such as expected use or system 'spirit', (Chin et al, 1997). And in conclusion, they stated that if one has to measure system usage itself, one must quantify, not evaluate it. They have opened up new paradigms in research in these areas that will definitely inform future directions by future researchers.

2.3 EVALUATION FRAMEWORKS

Techniques and evaluation frameworks for system usage has been evaluated by researchers. Across time, researchers have employed various methods and techniques such as formal usability testing, card sort, category membership expectation, focus groups, questionnaires, think aloud, analysis of site usage logs, cognitive walkthrough, heuristic evaluation, claims analysis, concept based analysis of surface and structural misfits, (CASSM), paper prototyping. Blandford et al. (2004) and Hartson et al. (2004) in their studies found the following evaluation techniques as not successful at highlighting problems in digital libraries; namely usability inspection, heuristic evaluation, cognitive walkthrough, claims analysis.

This is an overview of a few frameworks that exist for evaluating digital libraries.

a) Saracevic and Covi, Fuhr framework presents a holistic descriptions scheme made up of 4 major dimensions namely data collection, system technology, users, usage. They attempt to define a comprehensive set of evaluation criteria along some suggestions for the metrics to be used in evaluation. In this framework, the elicited aattributes are assigned to attribute groups within the dimension. Each attribute is evaluated and the attributes can be analysed and compare to results of other evaluations.

b) Tsakanos Framework has three system, user and content dimensions with three subsystems, interface, information retrieval and advanced functionality. It evaluates three conditions, performance, usability and usefulness of the system and defines the criteria, attributes and methods, tools to evaluate the attributes.

c) Sandusky's framework allows for a holistic and flexible manner for evaluating usability and effectiveness of digital libraries attribute by attribute. It has six attribute groupings or dimensions – Audience, Institution, Access, Content, services and Design and Development. Each attribute grouping contains other attributes expressed as dimensions or continua. Other framework that has been fronted is CASSM, Concept-based Analysis of Surface and Structural Misfits which has two dimensions, system and user.

2.4 EMPIRICAL EVIDENCE

Similar studies have been carried out in various academic sites as listed by Judy Jeng (2005 pg.100) in her paper *Usability assessment of academic digital libraries: effectiveness, efficiency, satisfaction and learnability*. Of interest to this study is that carried out by Hammil (2003) which was carried out at Florida International university and the method used was formal usability tests and questionnaires carried out among 52 subjects and the areas of interest was in design, organization, navigation, vocabulary and navigation and the criteria was efficiency and satisfaction. The FIU library usability study was to determine whether the design and organization of the top page of the site allow users to locate information easily. The three areas of focus was the catalogue search, article search and library services through specific questions related to each of the areas. Another interesting study was carried out in the University of the Pacific and the methods used were formal usability test among 134 students in the area of awareness of library resources navigation by Krueeger et al, 2004. There have been similar studies done in developing countries such as Nigeria and India, Akpojotor CLN, (2016), Sethi and Panda, (2012), Suseela, (2011) covering various themes that are similar to this study.

2.5 Conceptual Framework

Collis and Hussey (2003) gives the theory that a "theoretical framework is a collection of theories and models from the literature which underpins a positivistic approach". The framework used for this study is that based on the literature review that is related to the main areas of digital repository. Thus the framework for this study is derived from the works of Judy Jeng (2005a, 2005b) and other authors discussed in the literature reviewed where the variables specific for digital repositories are discussed.

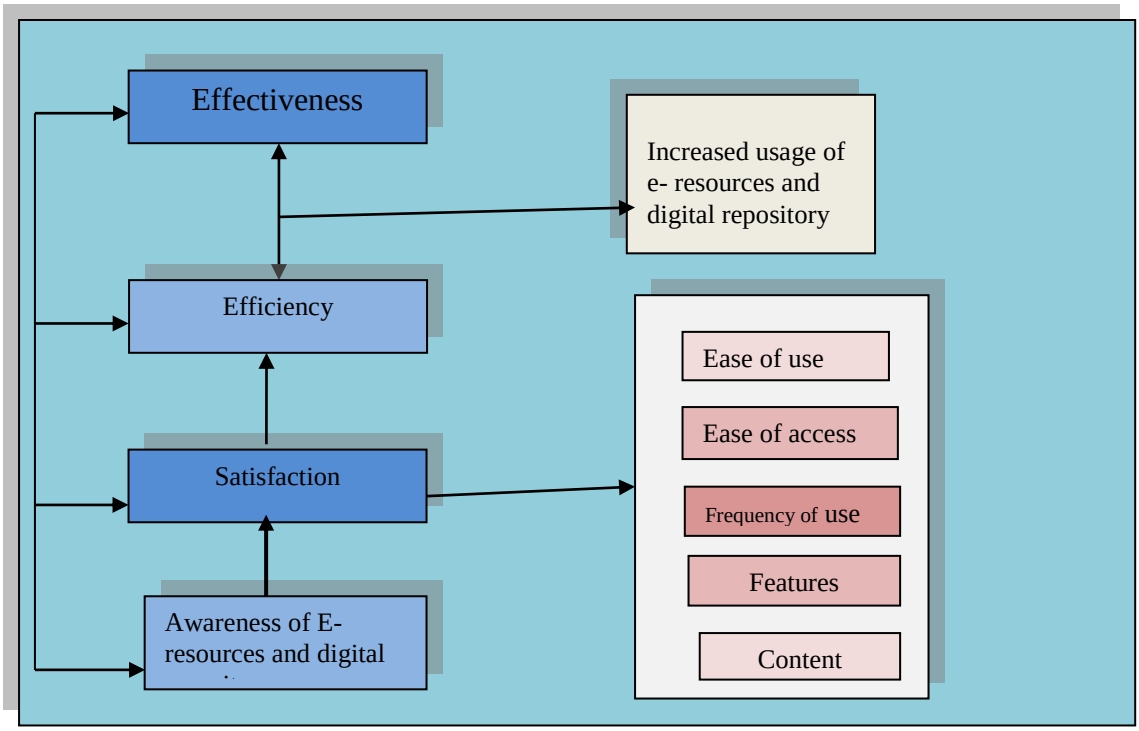

Figure 1: The Conceptual framework

2.5 Synthesis of the Conceptual Framework

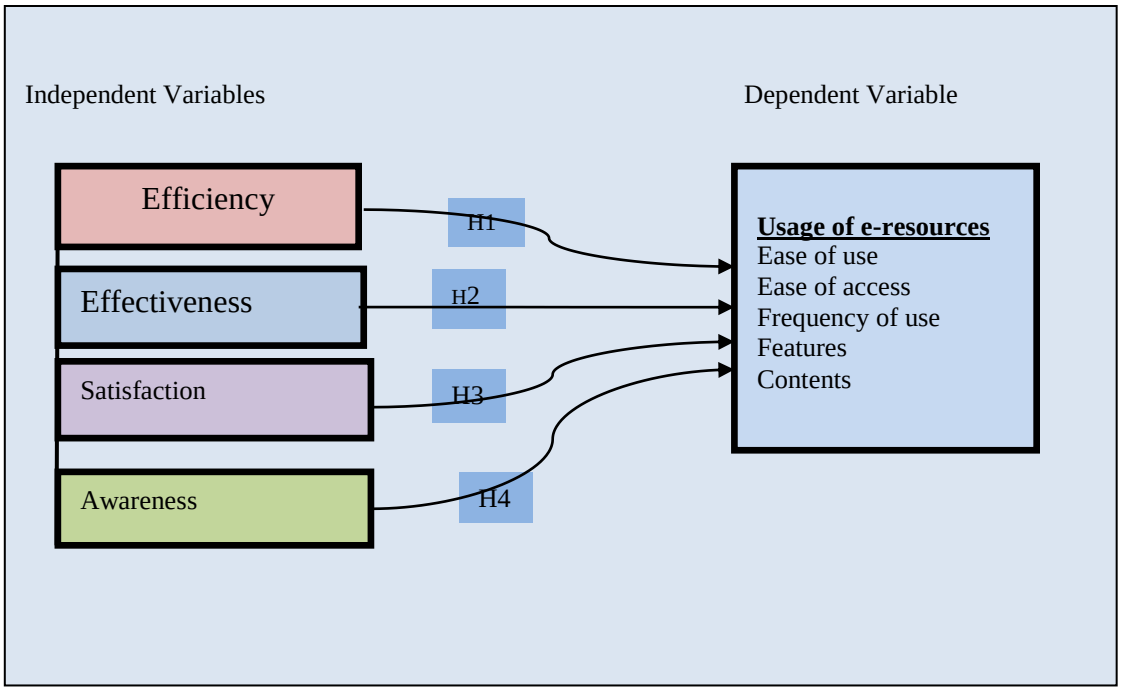

Figure 2: Conceptualizing the framework.

HI: Efficiency affects usage of a repository

H2: Effectiveness affects usage of a repository

H3: Greater User satisfaction impacts usage directly

H4: Awareness affects all the facilitating measures of a system which impacts usage.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This study describes the research methodology used in the research design, target population, data collection methods and data analysis that will used to investigate the issues stated in the study.

3.2 THE PHILOSOPHY

The choice of research philosophy in the study is the pragmatist philosophy. This is an approach in which the researcher uses the method which appears best suited to the research problem and does not get caught up with the philosophical debates about approaches. It recognizes the limitations of the various approaches and gives freedom of choice to use any methods, techniques and procedures either for quantitative or qualitative research that will be most suitable to give the best results. It offers great flexibility of enabling triangulation in data, methodological and perspectives in interpreting results. This is the approach of the study.

However, the positivist approach requires that the researcher sees social science research as a social reality made up of objective facts that can be measured precisely and used to test causal theories. The approach emphasizes hard facts measured in numbers and encourages the use of standard ways of doing things and adhering to the principle of replication of studies. The positivist theory holds the view that only factual knowledge gained through "observation (the senses), including measurement, is trustworthy". Therefore the role of the researcher has to focus very strictly on data collection and interpretation through objective approach and the research findings which are observable and quantifiable. This would also have been an appropriate approach to this study.

An interpretive philosophy research approach is where the researcher interprets the elements of the study. They assume that access to reality (given or socially constructed) is only through social constructions such as language, consciousness, shared meanings, and instruments" (Myers, 2008). The research approach which is by deduction and the strategies and methods of data collection are not appropriate for this study.

Realism philosophy as an approach to research would also give problems in terms of deduction approach, methodological approach which is mono and qualitative. It is defined by Phillips (1987, p. 205) as "the view that entities exist independently of being perceived, or independently of our theories about them."

3.3 RESEARCH DESIGN

Frankfort –Nachmias and Nachmias (1996) defines a research design as a blue print' that guides the investigator to collect, analyze and interpret observations. A research design provides the structure of the research. It is a logical model of proof that allows the researcher to plan from the first step to the last step of the research.

Kothari, (2011) explains that quantitative research is based on the measurement of quantity and its application to phenomena can be expressed in terms of quantity. The research method quantifies the problem by 'generating numerical data or data that can be transformed into useable statistics'. Facts and patterns are uncovered which is then used to quantify attitudes, opinions, behaviors, and other defined variables as well as generalize results from a larger sample population. I will be looking for patterns and facts that will be uncovered by the data collected. Collis & Hussey (2003) stipulates that qualitative data relates to non-numerical characteristics and qualities. Qualitative research also aims to provide answers as to why and how people come to make certain decisions. It is the approach that emphasizes the quantification of data and lead to statistical generalization of the theory being examined. The qualitative aspect will collect information from existing data and other various sources that will help dig deeper into the analysis of the research. There will be a combination of data collected from other sources to

produce results and the collection of views and opinions will combine to give the final result.

A sound research design can provide credible results. This means that the results must be judged trustworthy and reasonable and therefore research design is the proof that allows the researcher to make inferences about the relationships between the variables being investigated.

3.4 SAMPLING DESIGN

The sampling design employed in this study will be non-probability. This method allows the researcher to deliberately select the items for the sample as well as giving freedom in judgment and choice of the technique to be applied to get the best result for the study.

a) Sampling Technique

(Sekaran, 2003) recommends sampling rather than collecting data from the entire population when thousands of elements are involved. This study will employ a stratified random sampling technique method building stratified categories across the various categories of users. From the various built stratums across the categories appropriate sample sizes will be chosen further. A sample size of 384 respondents will be targeted. Krejcie and Morgan (1970) table for determining sample size from a given population has been used to arrive at this sample size (see table1). Out of this number, sample sizes will be allocated within the defined stratum equally.

b) The Population

The University of Nairobi is made up of nine colleges spread across the city of Nairobi and six satellite universities spread across the country. Each college is home to various schools and research institutes. There are also satellite campuses in the following places, Kisumu, Mombasa. ,Kakamega, Kibwezi.The university community has access to the University online library system and the digital repository from wherever they are. It is from this universe that an appropriate sampling unit is drawn that will adequately represent the population.

Assumptions and Exclusions: For purposes of this study, the survey by questionnaires was limited to users defined by the sampling process and will not be carried out to online users of the digital repository who maybe all over the world.

c) The Target population

Mugenda,(2003) states that people as individuals are objects who have the characteristics that can be measured. The population in this study will be all users of the digital resources and digital repositories of the University of Nairobi grouped into the following strata;

- Undergraduate students
- Postgraduate students
- Researchers
- Academic and teaching staff
- Repository staff, librarians and ICT staff

d) The study site and locations

The University of Nairobi has 13 Campuses. Three campuses were selected for the distribution of the questionnaires. They were the Nairobi University Main Campus, Chiromo Campus and Parklands Campus. These three campuses were selected because of the concentration of focus of their studies and proximity to each other for easy management of the questionnaire. The main campus is home to several schools specializing in arts and social science as well as several institutes while Chiromo campus hosts several schools and institutes in Science based courses and research. Parklands is home to the Faculty of Law. Together, they all have within them a diverse number of students from various disciplines giving a good representation of the study area and a choice of students from diverse backgrounds both at undergraduate and postgraduate level.

3.5 THE SAMPLE SIZE

According to Krisch Morgan table for population sampling, a total population size of 65,000, a sample size of 385 is adequate. The Table below shows the eventual distribution of sample size arrived at and used for the research according to the different user groups. Adjustments was made to the final size to give better representation to some of the users e.g the undergraduate and Master's student size was increased to 100 each while others were reduced.

	User Group	Sample size
1	Undergraduates	130
2	Postgraduates- (Masters)	110
3	Researchers & PHD students	62
4	Academic and teaching staff	30
5	Technical Staff Library and ICT	53
	Total	384

3.6 DATA COLLECTION METHODS

Data collection techniques that are selected should be used to serve or prove facts. The data collection methods for this study will involve the use and administration of questionnaires with structured and unstructured questions and interviews with managers and creators of digital repositories for primary data as well as data from secondary sources.

Primary data sources

The research will get data from four sets of questionnaires with questions that are similar and also different. The questionnaires are 1-5 likert type while there are those that are structured and semi structured. Four types of questionnaires are designed for each category of user in response to how it is anticipated that they can use the repository.

Questionnaires

There were different questionnaires for the different user group. Each questionnaire targeted the specific user group taking into consideration their likelihood of using certain digital resources on the library portals. The questionnaires have 5 point Likert style questions as well as semi structured questions.

3.8 Challenges of data collection methods

Collection of data through questionnaires is not easy as some students do not return the questionnaires or return them not fully completed. There have also been issues with Likert type questions as people complain of being constrained to fit their answers within the scope of the choices. A good portion of questionnaires were not returned on time. In this particular case, the data collection for two user groups, the lecturers and the staff came in so late as not to be included in the findings of this study. Eventually, after being analyzed, they will be presented in another forum.

3.7 RELIABILITY AND VALIDITY OF THE INSTRUMENTS

A pilot test was carried out with test questionnaires of 10 each for the users groups but they were not included in the analysis although they were part of the sample size of 384. The result was useful in making corrections to the final questionnaire.

3.8 DATA ANALYSIS

After the questionnaires were administered and received back, they were checked for consistency, accuracy and uniformity as well as being edited for completeness and consistency. Both content and descriptive analysis was employed in the questionnaires. The data was coded to enable the responses to be grouped into

various categories. Descriptive statistics such as means, median, mode and standard deviation was used to help in the data analysis. Appropriate tables and charts were built and used to present the data collected for ease of understanding and analysis.

Statistical methods used are frequency distribution employing the use of tables to show to show the distribution of respondents across the various variables. This will help give a quick overview of the findings.

The data collected through questionnaire was cleaned up and coded and entered into an SPSS statistical package and analysis done. The result is organized and described according to the themes for conclusions to be drawn. The data will be then grouped into frequency distribution tables to indicate variables and values and the patterns and frequencies of occurrences. Descriptive statistics gives measures like frequencies and percentages and the relevant implications of those values are observed. The result was pulled into MS Excel to make it easier for data management. Patterns are identified and pattern match utilized to predict outcomes.

Qualitative data will be presented through narratives and discussions under the various objectives and subject themes. Charts and graphs will be included to capture the narratives and descriptions. All these will be arranged under major themes and objectives.

The analysis of data in assessment of the usage of the digital repository employed correlation and simple regression models. These were used to establish the multiple regression coefficient of correlation and difference between extents of the relationship between e-resources and their usage. The beta (β) coefficients for each independent variable generated from the model were subjected to regression model that was used to test the usage of the repository as shown below,

$$\mathbf{y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots .. \ 1}$$

y	Usage of e-repository
$\boldsymbol{\beta_0}$	Is the constant
X_1	e-resources efficiency
X_2	e-resources effectiveness

X_3 E-resources Satisfaction

X_4 E-resources Awareness

β_1- β_4 Are the coefficient regression or change induced in y by change in x

ε error term

CHAPTER FOUR

RESEARCH FINDINGS, ANALYSIS AND DISCUSSIONS

4.1 INTRODUCTION

Data was edited by checking and adjusting for errors, omissions, legibility and consistency in order to ensure completeness, consistency and readability of the data.

This was done using frequency distribution in SPSS. Data was coded by assigning numbers to each answer and edited before it was entered into SPSS. Each question or item in the questionnaire has a unique variable name to identify all the information.

4.2 DEMOGRAPHIC INFORMATION

Overview and response rate

Two hundred (200) questionnaires were received from the respondents in the user group categories of undergraduates and postgraduates. After the coding and cleaning of the data, 72 questionnaires from the postgraduates and 92 from the undergraduates were considered good for inclusion into the data analysis. Eventually, only the following user groups were included in the analysis in the study;

1. The Undergraduate: This user group received 116 questionnaires but only 92 questionnaires came back in time for inclusion into the analysis.
2. The postgraduate: This user group received 84 questionnaires but only 72 came back in time for inclusion into the analysis.

Demographic information

The population of male students from the questionnaires returned were 63% while the female were at 30.4 0% for the postgraduate students. The majority of the respondents were in the 2nd year of study at 60%, 1st year at 20% and 3rd year at 20%.

The undergraduates' population of male students from the questionnaires returned was 65.2% while the female were at 34.7% for the graduate students. The undergraduate students were mostly in the age group of 18-25 at 66.3%, 26-35 at 31.5% and over 36 at 2%.

Table 1: Demographic Information

Gender	**Frequency**	**Valid Percent**
Male	60	65.2
Female	32	34.7
Total	92	100
Age Group	**Frequency**	**Valid Percent**
18-25	61	66.3
26-35	29	31.5
36-50	1	1.1
Over 50	1	1.1
Total	92	100
Campus		
Chiromo	14	15.2
Main Campus	71	77.2
Parklands	7	7.6
Total	92	100

Source: Survey data, 2016

4.3 OVERALL USAGE OF THE E-RESOURCES

4.3.1 Access to computers

At the preliminary stage, the students were asked if they could access computers and computing resources either through the University or their own laptops.

The undergraduate students who agreed that they have easy access to the digital information resources of the University of Nairobi either through their own means or through the university were 73.9 % and they said they had easy access to the information through the computing resources provided by the library or their own

laptops while 26.1% said they did not have this access. As for the postgraduate students, 59.7% had easy access while 36.1% had no access. This is significantly higher than those of the undergraduate students by a difference of 10%.

Lack of access at 36.1% and 26.1% for postgraduate students and undergraduate respectively is a significant percentage for those who cannot access computing facilities and it is important that access to computing at a university level be inched closer to 100% access as it forms a barrier to access to e-resources and hinders full utilization of the resources.

4.3.2 Ever used resources

There are nineteen products and services on the University of Nairobi Library Portal as listed below;

1. Online catalogue
2. Electronic books
3. Digital repository
4. Electronic journals
5. Electronic Newspapers
6. Electronic Magazines
7. Trial databases
8. Zotero
9. Sage research methods online
10. Subject guides
11. A-z list
12. Help desk
13. Ask a librarian
14. Library pocket guide
15. Rules and regulations
16. Title listings
17. Staff publications
18. Facebook Twitter
19. Plagiarism tools- turnitin

The respondents were presented with the 19 products and services online on the university library portal and asked to pick those that they have ever used. The **YES (Red)** shows the percentage number of students who responded to **ever having** used the service or product on the library platform while the **NO (Blue)** is for those

who responded to never having used the product or service. Across all the products, none usage is higher both for the undergraduates and postgraduates.

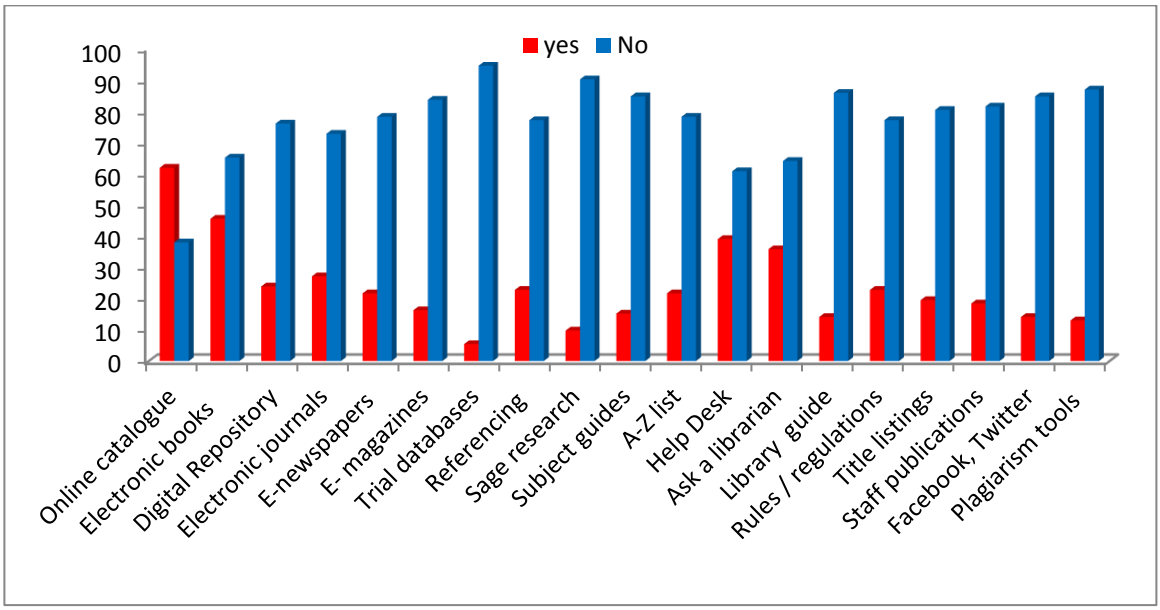

Figure 3: Ever used resources graduate students

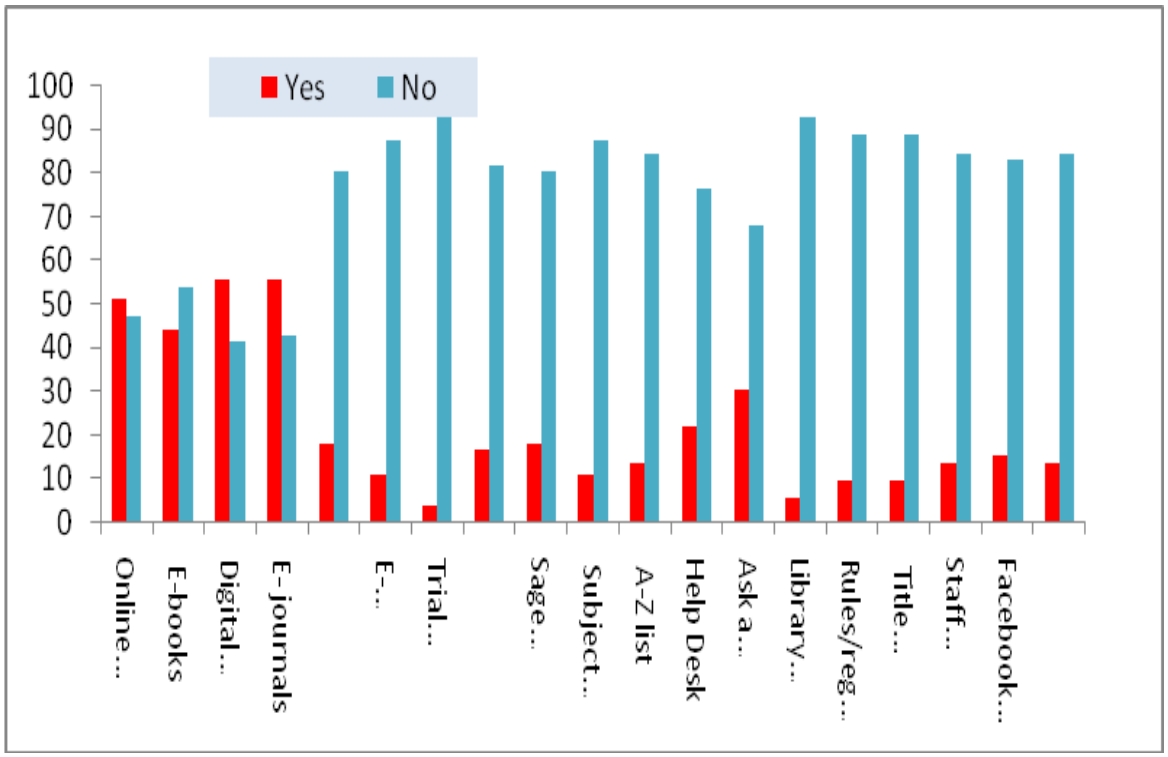

Figure 4: Ever used resources by postgraduates

4.3.3 Most used and least used

From the ever used resources, it was possible to cull out the least and most used resources and products and this is presented in the following charts.

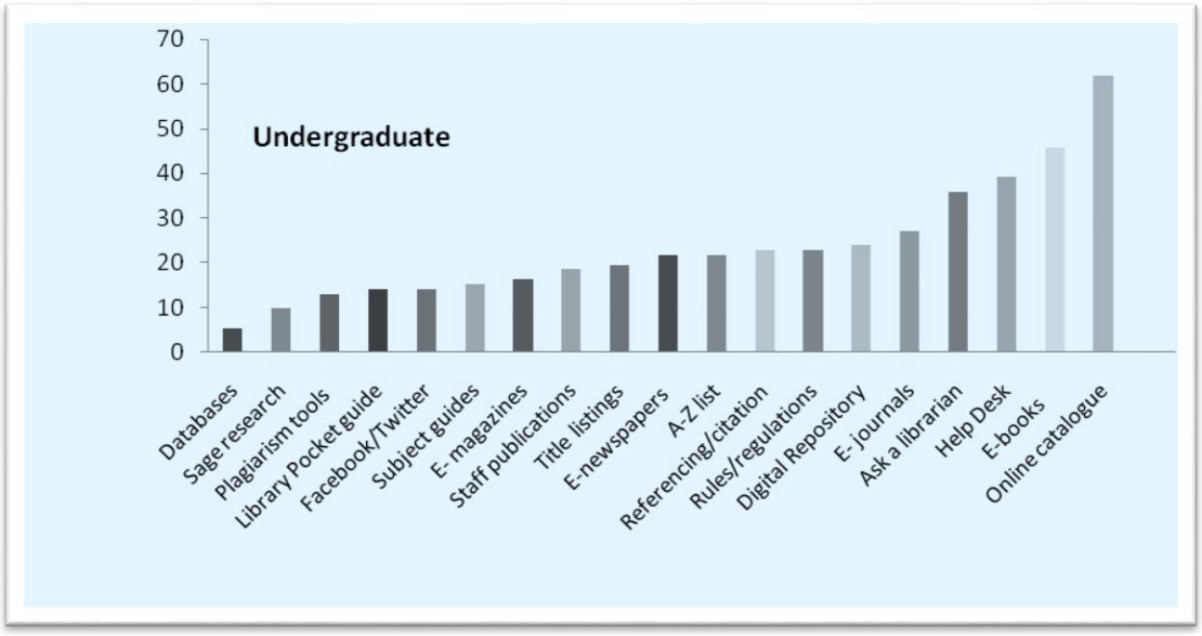

Figure 5: Least to most used resource among undergraduates

For the undergraduate user group, it is notable that the online catalogue is the most used and therefore a conclusion can be made that this service is essential to this group followed by the e-books, the help desk and ask a librarian while databases, sage research, plagiarism tools and the library pocket guide are least used by this group. Low usage of facebook is a surprise finding as it is always thought that usage of social media is high among this group. Qualitative data and the discussions with students revealed that they actually use their smart phones and not computers or laptops for such interactions. Another interesting revelation was their almost lack of usage of databases. And they alluded to the fact that perhaps the use of the word database puts off usage because according to the students, the word database sounds “technical and official and not for the ordinary student user”.

We see that the electronic journals, the online catalogue and the digital repository as well as the electronic books are important to this group. The Databases comes last but facebook and twitter is higher up for this group of users than the undergraduate which is unexpected.

This information is relevant to help determine which resources and products are crucial and which ones can be done away with or modified in-order to increase usage.

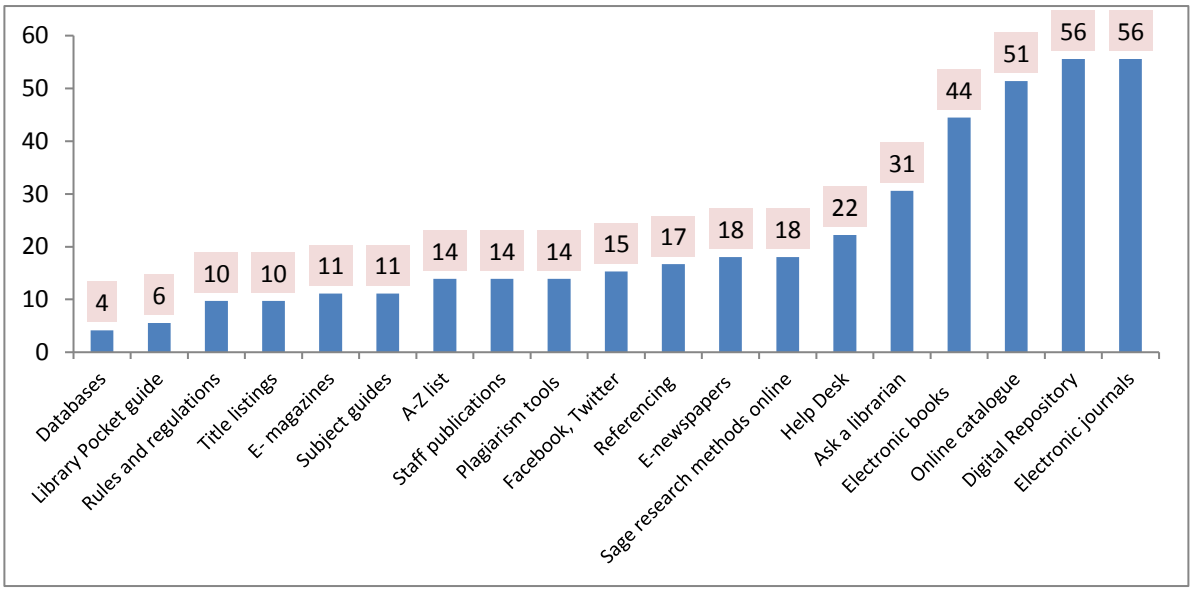

Figure 6: Least to most used resources among postgraduates

4.3.4 General Awareness about e-resources

Users were asked various questions concerning awareness and knowledge about the e-resources and the digital repository specifically on how they became aware, the methods used to create awareness and their opinion and thoughts on the effectiveness of these methods.

When awareness and information about the products and services offered is lacking, they are at a great disadvantage. According to the respondents, a large number of them had not used the resources because they were not aware and they lacked information about the many products and services. Figure 7 captures the narratives.

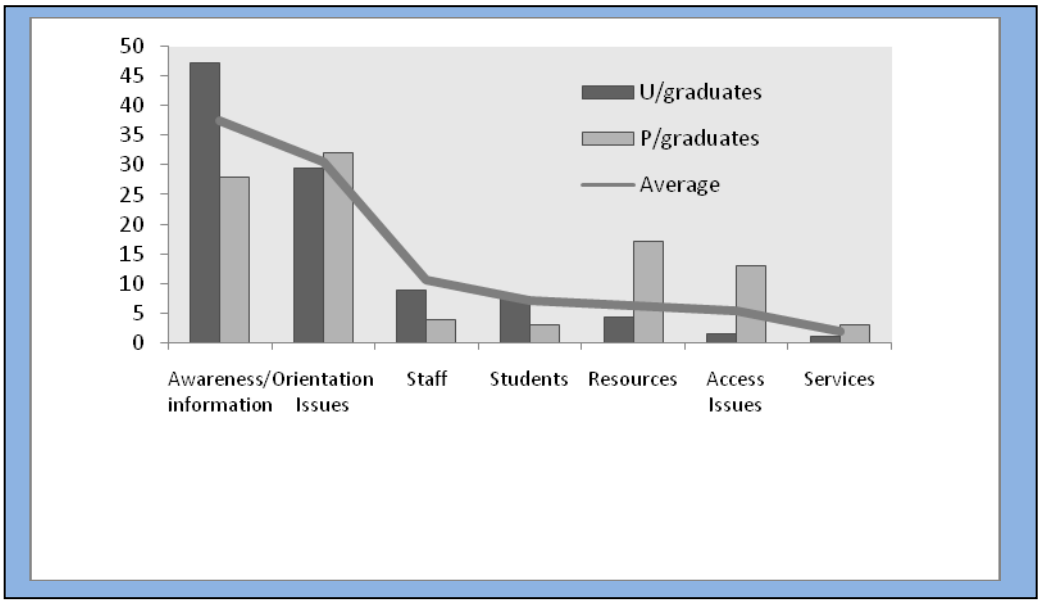

Figure 7: Reasons for not using the e-resources: lack of awareness features prominently

It shows that lack of awareness and information cut across both the undergraduates and graduate students in being the most important in the reason why they had not used the e-resources. Although among the postgraduate student, issues of orientation slightly edged out awareness, it was still a close second. Resources and issues of access came a close third and fourth for the postgraduate students while for the undergraduates, they were more concerned with matters to do with staff and students.

This study captured system usage nuances that are unique to Africa. Where in the developed countries, almost everyone would have seen and used a computer and would expect facilities and digital resources in the academic institutions, in Africa, this would not be the case. Unfamiliar users of computers from Africa who come from a background in which they have never seen a computer would require more aggressive sensitization and training about e-resources when they join an academic institution.

4.3.5 Awareness about the digital repository

The respondents were asked about their awareness of the digital repository, their knowledge about its use, and they were also able to rate the repository against other products on the library portal.

When respondents were asked if they were aware of the digital repository, the postgraduate students responded positively with a yes for being aware at 69% while 38% were not aware. The readings for the undergraduate students on the other hand was lower although not unexpected because at their level, they are not expected to use the repository much. They were at 37% for yes for being aware and 67% for not being aware.

Further investigation to probe into what the students thought was the use of the digital repository elicited various answers. This was in response to the question what have you used the digital repository for. 43% used it to get information, 5% had used it to post their papers while the 5% went to the others group. Only 5% percent of the undergraduate students had ever used the digital repository for information.

The respondents were again asked to state what they mostly associated the digital repository from a list of 4 choices and others. The result is in the table below;

Table 2: knowledge about use of Repository

Perception of what repository holds	Undergraduate	Postgraduate
Holds Thesis	12.2%	36%
Has Academic research papers	26.7%	35%
Has both academic and thesis	20.0%	51%
No idea	41.1%	26%

The post graduates were more aware of the existence of the digital repository and their usage more than the undergraduate students. This was not unexpected as postgraduate students receive targeted training on the digital resources. Even though one would say that the responses shows that the student community are aware of the digital repository at an overall percentage of 75% for postgraduate and 59% for undergraduate who responded to this question and have the correct perception about its usage, the red flag here is in the group who said *they had no idea – at 41.1% for undergraduates and 26% for postgraduates*. This is a significant number of users especially for the postgraduate at 26%. They all ought to know what the digital repository is because their work is uploaded there as part of the University's academic collection.

In rating of the most important resources in the portal, the repository was rated as highly important and essential against the other sources vis a vis those who rated it as average and not important.

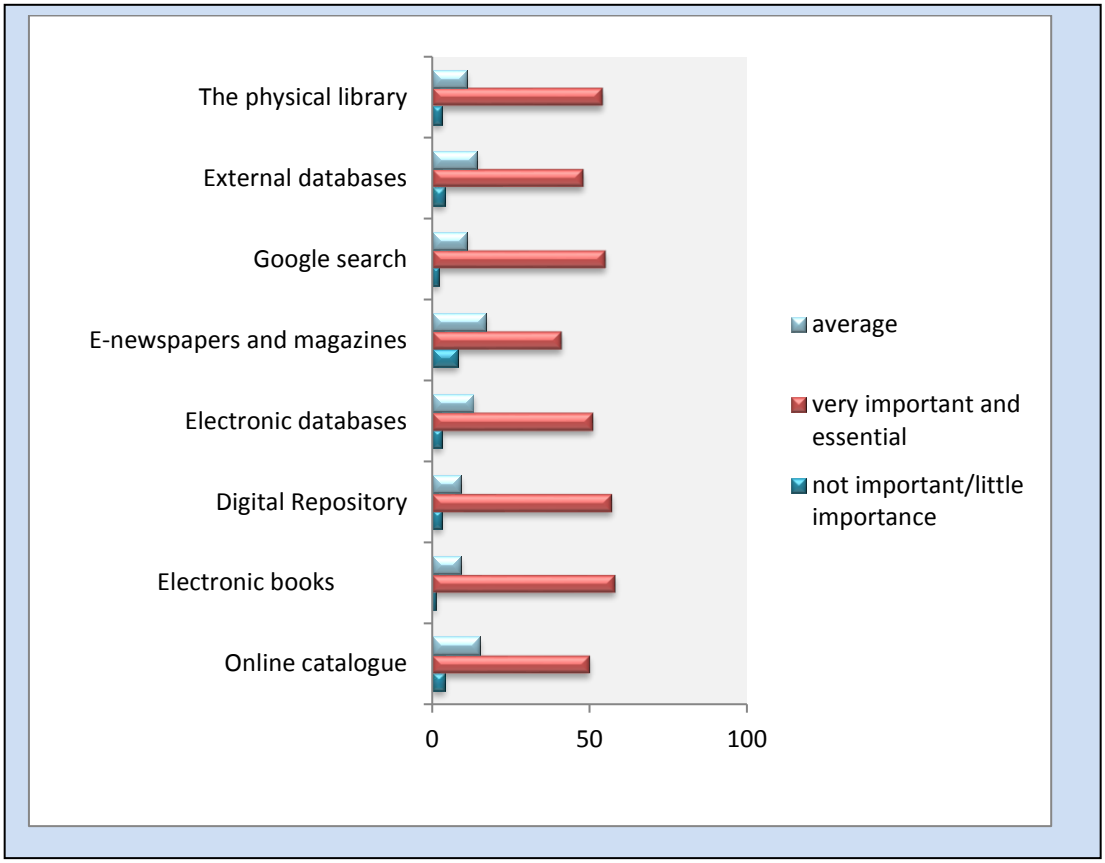

Figure 8: Rating importance of repository

Finally, when the respondents were asked if they would in future be happy to have their projects uploaded on the digital repository, there was a positive response at 65% for "Yes" against a 35% for a negative response of NO.

Overall, the study reveals that the digital repository is more used by postgraduate students to access research documents, theses and research papers more than the undergraduate students. The postgraduate students did reveal that they are aware of the digital repository more than the undergraduate users because they write projects and thesis which will be hosted in the repository and it is important that they know about it.

4.4 USAGE DRIVERS OF THE DIGITAL REPOSITORY.

System usage drivers are those elements that can enable or provide an enabling environment which brings more users to the site and make them want to do so again and again. The above results confirm how the digital repository is regarded among the crucial users – the postgraduate students - and their responses on what they know about it.

4.4.1 Awareness

Lack of Awareness and adequate knowledge about the services and product offered by the institution is the leading driver to information utilization of the digital repository. Majority of the respondents stated that awareness affected their use of the digital repository at 44%. This was followed closely by issues related to orientation at 29%, and issues to do with staff (such as non-availability, skills, negative attitude of the staff etc) and student issues (such as apathy and disinterest in the orientation exercises, and a general negative attitude) both at 9% and accessibility and logging issues at 5%.

Awareness and information is an important component in increasing the usage of e-resources. When users are not aware of the existence of the products, they will find it by serendipity or never at all. If users do not perceive a potential benefit, whether the benefit is actual, they will be less likely to use the system. Therefore, it is important that there is increased awareness and knowledge to improve intermediate outcomes for lack of knowledge, self efficacy and usability. Awareness is the responsibility of the managers of the system and getting users to know how to use the system and be comfortable with it are important components of their work.

When users were asked about how they became aware and received their information about utilization of the e-resources and the repository, they responded as shown in figure 9.

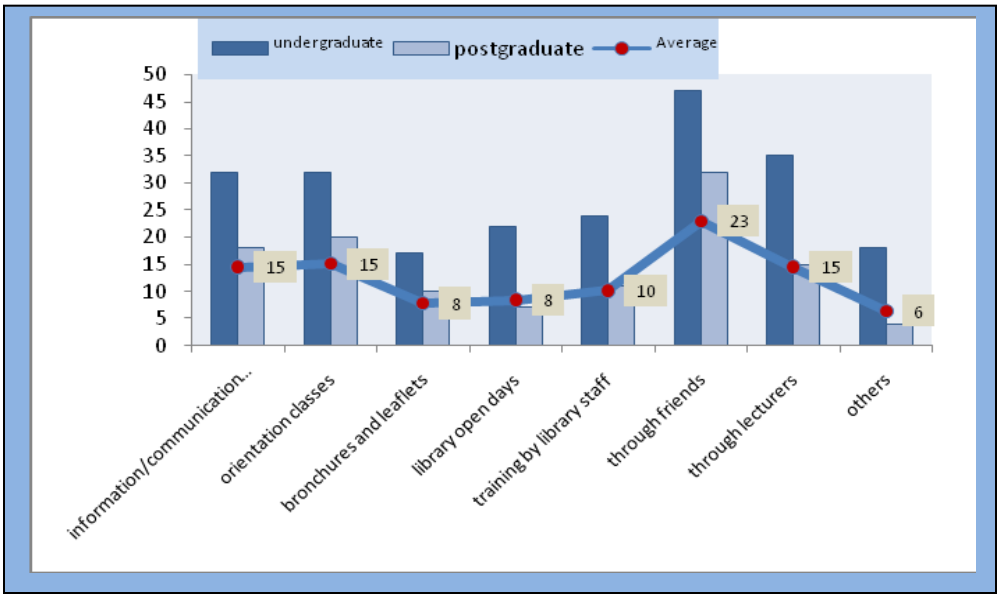

Figure 9: Ways through which users became aware of resources

An interesting aspect about the result in this portion of the research is that users in both groups reveal that their friends are the most important source of information for their utilization of the e-resources as well as the digital repository, followed by information and communication classes. Taking cognizance of the results shows the areas of focus and concentration needed to make inroads in creating and increasing awareness among the users. The friends as a source of information took an average of close to 25% among all the other mode of delivery of information. This shows that it is an important channel of communication that cannot be ignored and can be exploited in seeking to increase awareness. The channel 'friends' being used by e-resource managers to increase awareness can become an interesting area of engagement. Both information communication classes and orientation classes are the next most important areas of focus in increasing awareness which can drive usage.

Among the many recommendations that users made about increasing awareness were innovative ideas such as sending e-mail alerts, having lecturers integrated as part of the training in use of digital resources, having the services and products on notice boards in lecture halls and campuses as well as having meaningful and useful orientation that they can take home with them.

4.4.2 Satisfaction, frequency and ease of use

A key indicator of usage in the digital repository is satisfaction and frequency of use. Frequency of use is an important link to usefulness. It shows importance and the value users attach to the digital product. When there is apathy towards a system, the users show disinterest and lack of fulfillment and in the service not satisfying their needs. If they like it, they will use it again and again.

When users were asked how frequently they used the products and services on the library portal, the chart below captures the information. From the research, the **never use** has the highest response across all products and services.

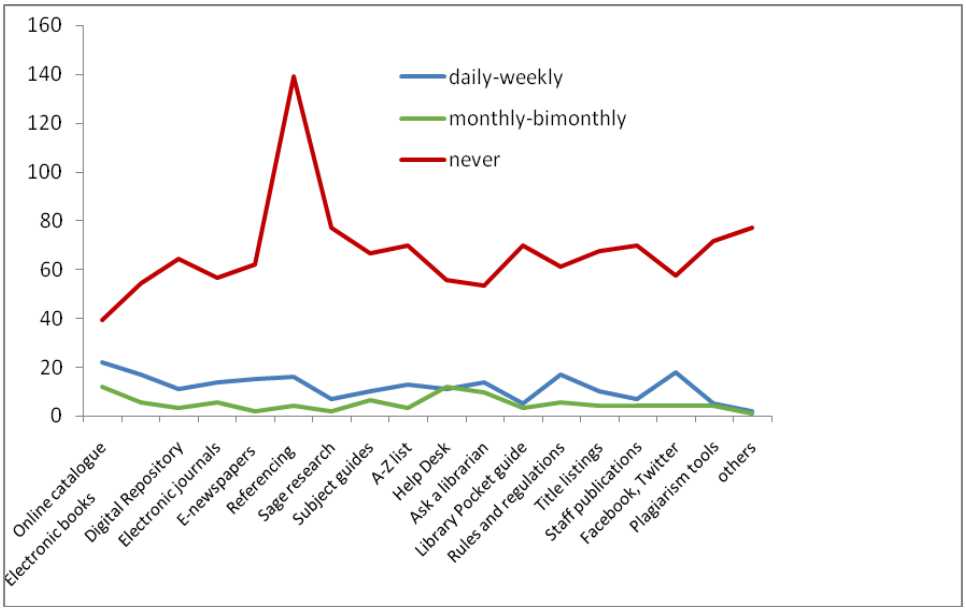

Figure 10: Frequency of use

And so the need to explore the critical elements that can not only increase usage but also compel the users to visit the site many more times to utilize the various products cannot be underscored.

Ease of usage is a strong driver. When ease of usage was investigated in the study, the result is captured in figure 15.

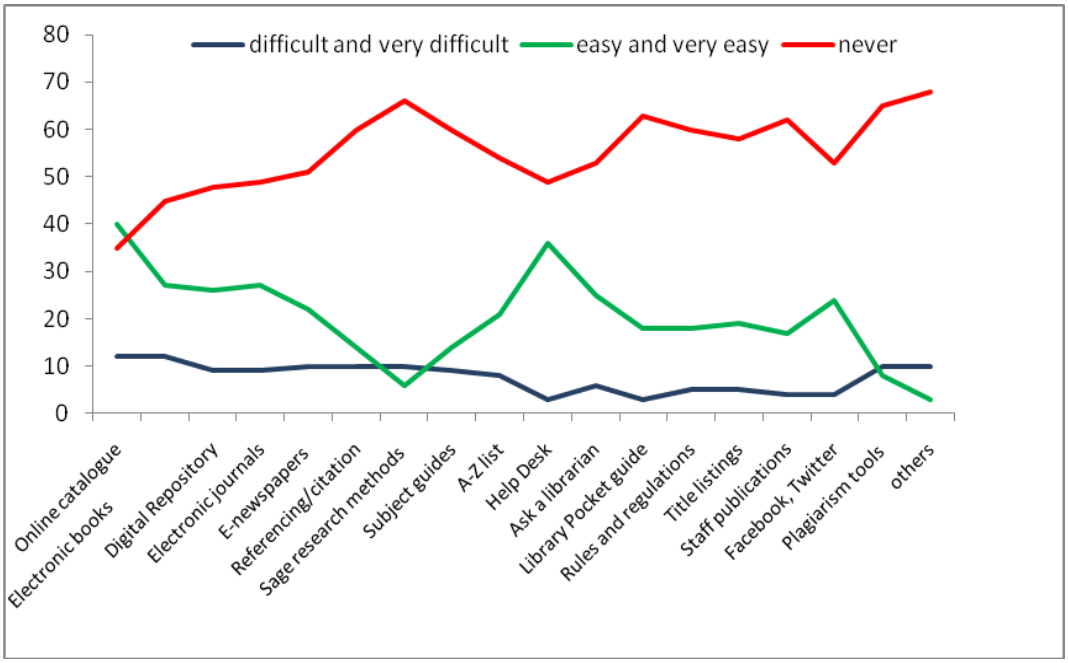

Figure 11: Ease of use by respondents

The respondents were asked how easy it was for them to use the e-resources that they had identified. The chart shows that clearly, the *never use* response is the most common response among both the students user categories. They have actually never used the products or services and those who find it easy to use the products or services are few indeed. Ease of use can only improve when the never use graph reduces and when ease of usage is improved, there will be improved usage of the resources.

4.4.3 Increased information needs

Increased need by researchers for full documents on PDF and thesis online will drive many more students to the site especially when issues of logging in and internet connectivity are finally sorted out. As the university intensifies the requirement for all research work by both staff and postgraduate students to be hosted on the digital repositories, there will be a massive response to these stimuli as many past students will be visiting the repositories to check their work more than when it is held in the physical library.

4.4.4. Barriers to usage of the digital repository

The respondents were given a list to identify the barriers to usage of digital repository. They were required to indicate whether they considered the issue a barrier, not a barrier or a little barrier. Their response of those who identified lack of relevant staff in both the library and ICT as being the biggest barriers to usage of the digital repository were 65%, followed by 57% for both who identified lack of training and lack of information. Logging issues and poor internet connections were also considered big barriers by 41% and 40% as well as lack of access to computers at 39%. Others at 16% and 14% mentioned documents not being full text and materials not downloading respectively.

4.5 DESCRIPTIVE ANALYSIS

This is the analysis of data that helps describe, show or summarize data in a meaningful way. Simply stated, they refer to means, ranges, and numbers of valid cases of one variable. In this case, all independent and dependent variables are illustrated below. The overall objective of the study was to assess usage of the digital repository and factors that affects it. In this section the study used the following ranges for analysis interpretation (1-2.4 Agree, 2.5-3.4 Uncertain and 3.5-5 Disagree). In this section, the descriptive analysis for objective 2, 3, 4 and 5 will be analyzed and tested using the hypothesis stated earlier.

4.5.1 Effectiveness of digital repository

From the analysis of effectiveness, the findings show that all the respondents agreed that they were able to find the information needed (mean=1.01, std dev=0.11), repository output was as expected (mean=1.61, std dev=0.74), the content of the repository is

accurate (mean=1.50, std dev=0.69), search results are relevant (mean=2.04, std dev=1.07), and the repository allows linkages to other sources (mean=1.93, std dev=0.88), table 4 below.

Table 3: Descriptive statistics - Effectiveness

Statement	Mean	Std. Deviation	N
I am able to find information needed	1.01	.11	72
Repository output was as expected	1.61	.74	72
The content of the repository is accurate	1.50	.69	72
Search results are always relevant to the search	2.04	1.07	72
Repository allows linkages to other informational sources	1.93	.88	72

4.5.2 Efficiency of Digital Repository

From the analysis on efficiency, the findings show that the respondents all agreed on the following listed features of the repository as shown by the mean and standard deviation on table 5 below.

Table 4: Efficiency analysis

Statement	Mean	Std. Deviation	N
Ease of retrieval	1.34	.69	72
Ease of Navigation	1.41	.71	72
Ease of getting online assistance	1.43	.84	72
Valid N (listwise)			72

4.5.3 Satisfaction on Digital Repository Usage

The analysis on satisfaction findings show that the respondents agreed on issues concerning satisfaction of the repository as shown by the mean and standard deviation on table 6 below.

Table 5: Satisfaction analysis

Statement	Mean	Std. Deviation	N
Clarity of information	1.99	1.00	72
Quality of indexing terms	2.00	1.01	72
Quality of retrieval terms	2.14	1.04	72
Quality of searching options	2.28	1.02	72
Amount of information retrieve	2.18	1.02	72

4.5.4 Awareness on Digital Repository Usage

The analysis on awareness findings show that the respondents agreed on awareness of online catalogue, electronic books and journals and where uncertain on awareness of electronic database-newspaper and magazine and external database as shown by the mean and standard deviation on table 6. below.

Table 6: Awareness analysis

Statement	Mean	Std. Deviation	N
Online catalogue	1.59	.71	72
Electronic database	2.70	1.30	72
Electronic Books and Journals	2.26	1.51	72
E-newspapers and magazine	2.83	1.36	72
External database	2.73	1.28	72

4.5.5 Digital Repository Usage

The analysis on digital repository usage findings show that the respondents agreed on ease of usage, access and frequency of use and disagree on features and content as shown by the mean and standard deviation on table 7. below.

Table 7: Repository analysis

	Mean	Std. Deviation	N
Ease of use	1.76	1.03	72
Ease of access	2.31	1.32	72
Frequency of use	2.39	1.35	72
Features	3.15	1.03	72
Content	3.16	1.27	72

4.6 PATH ANALYSIS

4.6.1 Correlation Analysis

"Pearson correlation was used to measure the degree of association between variables under consideration i.e. independent variables and dependent variable. Pearson correlation coefficients range from -1 to +1. Negative value indicates negative correlation and positive values indicate positive correlation".

"A positive *r* value expresses a positive relationship between the two variables (the larger the independent variable, the larger the dependent variable) while a negative *r* value indicates a negative relationship (the larger the independent variable, the smaller/lesser the dependent variable). A correlation coefficient of zero indicates no relationship between the variables at all. In instances where Pearson coefficient <0.3 indicates weak correlation, Pearson coefficient >0.3<0.5 indicates moderate correlation and Pearson coefficient >0.5 indicates strong correlation".

The findings from correlation test showed that, two variables showed a negative relationship and two showed positive relationship as indicated in the matrix table below. The effectiveness showed negative significant relationship on digital repository usage, (Pearson's r=-. 542, p<0.000, satisfaction also showed negative significant relationship on digital repository usage, (Pearson's r=-.394, p<0.000. Efficiency has a positive insignificant relationship (Pearson's r=0.210, p<0.061), While awareness also showed positive insignificant relationship, (Pearson's r=0.093, p<0.0411) as shown in table below.

Table 8: Correlations analysis

Correlations

		Effectiveness	Efficiency	Satisfaction	Awareness	Repository usage
Effectiveness	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	72				
Efficiency	Pearson Correlation	-.023	1			
	Sig. (2-tailed)	.839				
	N	72	72			
Satisfied	Pearson Correlation	.749**	.021	1		
	Sig. (2-tailed)	.000	.852			
	N	72	72	72		
Awareness	Pearson Correlation	-.212	.037	-.145	1	
	Sig. (2-tailed)	.059	.747	.199		
	N	72	72	72	72	
Repository usage	Pearson Correlation	-.542**	.210	-.394**	.093	1
	Sig. (2-tailed)	.000	.061	.000	.411	
	N	72	72	72	72	72

**. Correlation is significant at the 0.01 level (2-tailed).

4.6.2 Regression Analysis

Model Summary

From the model summary table, R^2 is a statistical term saying how good one term is at predicting another. If R^2 is 1.0 then given the value of one term, you can perfectly predict the value of another term. If R^2 is 0.0, then knowing one term does not help to know the other term at all. More generally, a higher value of R-Square means that you can better predict one term from another. According to King'oriah (2004), the correlation coefficient r, below merely talks of relationship between variables, but coefficient of determination (r^2) derived from regression analysis, explains how much of the variation within the dependent variable (sustainable environment) is caused by the variation of each of the independent variables, in exact percentage. In this case, all the independent variables accounts for 29.8 % of digital repository usage in the institution of higher learning in as shown in part one of model summary below;

Table 9: Predictors

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.578[a]	.334	.298	.57473	.334	9.404	4	75	.000

a. Predictors: (Constant), Awareness, Efficiency, satisfaction, Effectiveness

4.6.3 Analysis of Variance

ANOVA table shows results of analysis of variance, sum of squares, degree of freedom (df), mean square, regression and residual values obtained from regression analysis. From table below, the mean square is 3.1. The F static which is regression mean square divided by the residual mean was 9.40. Degree of freedom df, was 4.00. Statistically, the overall relationship was very significant with significant value, P value = 0.000, (P < 0.05).

Table 10: Anova analysis

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.425	4	3.106	9.404	.000[b]
	Residual	24.773	75	.330		
	Total	37.198	79			

a. Dependent Variable: Repository usage

b. Predictors: (Constant), Awareness, Efficiency, satisfaction, and Effectiveness

4.6.4 Regression Coefficients

From the coefficient table below, the first variable (constant) represents the constant, also referred to as the Y intercept, the height of the regression line when it crosses the Y axis. In other words, this is the predicted value of sustainable environment in institutions of higher learning all other variables are 0. The beta values (B) are the values for the regression equation for predicting the dependent variable from the independent variable. In this case, interpretation of beta coefficients means that holding all other independent variables constant. In the table every unit change on effectiveness affects digital repository usage by -.553, while Efficiency shall influence digital repository usage by .199, Satisfaction influences digital repository usage by .012 and finally awareness affects digital repository usage by -.029. Therefore, awareness is a negative predictor of digital repository usage while effectiveness, efficiency and satisfaction are positive predictors of digital repository usage. However only two variables proved to be

significant, effectiveness (P=0.000) and efficiency (P=0.039). Two more variables were insignificant, satisfaction (P=0.934) and awareness at (P=0.761).

Coefficients

Table 11: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	4.533	.320		14.160	.000	3.895	5.171
	Effectiveness	-.717	.187	-.553	-3.829	.000	-1.090	-.344
	Efficiency	.214	.102	.199	2.102	.039	.011	.417
	Satisfaction	.010	.120	.012	.083	.934	-.230	.250
	Awareness	-.020	.064	-.029	-.305	.761	-.148	.108

a. Dependent Variable: Repository usage

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 \ldots\ldots\ldots\ldots (1)$$

$$y = 4.53 + -0.717\, X_1 + 0\ .214\, X_2 + 0.010\, X_3 + -0.020\, X_4$$

4.7 HYPOTHESES TESTING

Hypothesis testing is the formal procedures used by statisticians to accept or reject statistical hypotheses. After the analysis, the hypothesis was tested. The findings showed that two of the stated alternate hypotheses were accepted; while the one was rejected. Specifically, it was found that effectiveness and efficiency have significant effect on digital repository usage (P=0.000<0.05) and (P=0.039<0.05) respectively while satisfaction and awareness proved to have no significant effect on digital repository usage with P-values (P=0.934>0.05 and (P=0.761>0.05 respectively.

Table 12: Hypothesis testing

Hypothesis	Coefficient P-Values	Conclusion
HI: Efficiency affects usage of a repository	P=0.000<0.05	**Accept H_1**
H2: Effectiveness affects usage of a repository	P=0.000<0.039	**Accept H_2**
H3: Greater User satisfaction impacts usage directly	P=0.934>0.05	**Reject H_3**
H4: Awareness affects all the facilitating measures of a system which impacts usage.	P=0.761>0.05	**Reject H_4**

4.8 DISCUSSION OF THE FINDING

Research findings in this study shows that efficiency and effectiveness affects usage of a repository while awareness and satisfaction does not impact on usage. These results agree with studies done by Frøkjær, E., Hertzum, M., & Hornbæk, K. (2000) who also found weak correlation between effectiveness, efficiency, and satisfaction. In their research in which they sought to find out by measuring usability, the correlation between effectiveness, efficiency, and satisfaction, they were able to offer succinct explanations and answers as to why the results in a study of this nature would turn out this way. They stated that,

" the weak correlation between effectiveness, efficiency, and satisfaction has three implications in regard to the choice of measures in evaluations of system usability". The first one is the choice of selection of usability measures as a recurring issue in usability studies. And on this, they concurred with the idea that one should "always measure the three aspects of efficiency, effectiveness as well as satisfaction because use of a narrower selection of usability measures may result in (a) making some implicit or explicit assumptions about relations

between usability measures in the specific context, or (b) run the risk of ignoring important aspects of usability."

In their study, *an analysis of the CHI-studies* , it showed how interpretation of data based on only one or two usability aspects leads to unreliable conclusions about overall usability. The three usability aspects capture different constituents of usability and there is no substitute for including all three aspects when doing usability evaluations. There is also lack of clear-cut advice that can be given about which usability measures to use in a particular situation. They went on to state that the " The identification of usability measures that are critical in a particular situation is a central part of any evaluation of system usability and requires a firm understanding of how tasks, users, and technology interact in constituting the use situations within the particular application domain . Based on their analysis of data from studies of information retrieval where they found only a weak correlation between measures of the three usability aspects, they were able to stress on the relations between efficiency, effectiveness, and satisfaction--the three aspects of usability—as not being well understood and noted that other studies had implied a similarly weak correlation between usability measures. They affirmed that efficiency, effectiveness, and satisfaction should be considered independent aspects of usability, unless domain specific studies suggest otherwise. Studies that employ measures of only a subset of the three usability aspects assume either that this subset is sufficient as an indicator of overall usability or that the selected measures are correlated with measures covering the other aspects of usability. And such assumptions are often unsupported. Hence, these studies jump to conclusions regarding overall usability while measuring, say, efficiency only. And in conclusion, they stated that usability testing of computer systems for complex tasks should "include measures of efficiency, effectiveness, and user

satisfaction. In selecting these measures, the application domain and context of use have to be taken into account so as to uncover the measures that are critical in the particular situation" , Frøkjær, E., Hertzum, M., & Hornbæk, K. (2000) .

Several of these sentiments are consistent with those of Burton –Jones and Straub, (2006) who saw this gap and made a contribution on the need to re-conceptualize usage. Fronting what they termed a better approach, they called for the researcher to be the one to "choose appropriate measures for their objective, theory and methods and use these measures to capture more or less the use of the system within a particular context".

When the rejected hypothesis was subjected to qualitative findings, it is noted that qualitative findings disagreed with the outcome that user awareness and satisfaction impacts usage directly. This then helped forge the conclusion that the research framework did not need to change and can be adopted for evaluation on digital repository usage. The qualitative findings affirmed that awareness does affect usage. This agrees with research done by other researchers in Africa. Akpojotor CLN, (2016) presented findings that showed that awareness does indeed affect Digital Repository Usage, a fact uncovered in studies on e-resources in a Nigerian University. He found out that postgraduate students of library and information science are quite aware and because of this, they highly use electronic information resources which are essential tools for empowering postgraduate students of library and information science in Southern Nigeria.

Another findings on a study by Ajuwon (2003) on ICTs by health science students at the University College Hospital (UCH) Ibadan, revealed that students studied could not use a computer, and that the use of the databases was poor, due to lack of awareness, lack of access to computers, insufficient training and high cost of provision of electronic information resources subscription.

Interrogating the corresponding component of sources of awareness among the user groups, it was found that the students listed friends as their foremost source of information concerning e-resources. This shows that there is something amiss in a

setup where the institution should feature prominently and be in the forefront of imparting awareness and information directly to students. Then the institution may need to recognize friends as an important channel of communication for its goods and services.

At the same time, being able to access the computing facilities at a university is very critical and is closely tied in with awareness. Ojo and Akande (2005) enforced the awareness construct in their study by stating that students' level of access, usage and awareness of electronic information resources at the University College Hospital (UCH) Ibadan, Nigeria is not high and that the major problem however identified in their study is lack of information retrieval skills for exploiting electronic resources, thus making the level of usage of resources by medical students very low.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter summarizes the findings, draws conclusions and gives recommendations based on the outcomes of the study.

5.2 SUMMARY OF THE FINDINGS

From each objective of the study, it was possible to draw a summary from the research findings. The study established that efficiency and effectiveness of the digital repository have an effect on usage of the digital repository. It is evident that these attributes contributes significantly to repository usage. The benefits of all these include ease of access to online information and quick and efficient online searching from wherever the user maybe, anywhere in the world as well as a great experience in performing their work. Information that is up-to date can be accessed anywhere and anytime within the shortest period of time. At the same time, the users do not need to interact with the few staff once they know how to access the resources. Eventually, with the new mix of students many of whom are now part-time, they need not come to the library physically because they can access relevant information from the comfort of their offices or home and at their own pace. This also offloads users of the physical library space which can sometimes get crowded. Users agreed that the repository increase their visibility because when their work is on the repository, they are visible worldwide and this brings them into contact with the outside world of academia where students get the opportunity to interact with other scholars.

Satisfaction and awareness are greatly supported by the qualitative data and literature support. The study brought into focus the fact that without awareness, people will not know about the resources and even how to use them. The resources will therefore end up being underutilized and as much as the managers put in resources and effort into the products and services, their users do not benefit

because they do not use the resources. This is critical in Africa where it cannot be assumed that users have ever seen a computer. Nationally, there is a divide where some students come in already having knowledge about computers while others have never had electricity. Creating awareness and giving continuous information about the products and services to the users is a critical responsibility. The respondents in their response gave creative ideas about how they can be kept upto date and updated about the products and services and these included e-mail alerts, short message services, advertisement on their walls in the halls of residence, cafeterias, lecture halls and theatres, targeted information delivery to them in lecture theatres and classes as well as making it compulsory for them to receive the trainings. Indeed top on their list of channel of information are their friends and the need to explore how this can be utilized is important. It then follows that satisfied users are those who are aware and overall, it drives usage and uptake of services and products among key clients.

Some of the other challenges identified in this research are insufficient technical staff support, inadequate computers with internet connections, epileptic power outages, slow internet connectivity, unreliable network connections, password access and rights. It can therefore be concluded that in order for university of Nairobi and other Institutions of Higher Learning in Kenya to realise efficient and effective e-resources and digital repository usage, they should minimise or totally eliminate the challenges and barriers which were confirmed to be factors that affect usage.

5.3 EVALUATING RESEARCH OBJECTIVES

Objective 1: To investigate the drivers and barriers to the digital repository usage in Academic institutions

The usage drivers were awareness, satisfaction, frequency and ease of use as well as increased information needs of the users. The findings showed that all of these drivers influence usage of the digital repository. Further findings showed that the barriers to digital repository usage includes lack of available e-resources staff, lack of training on use of e-resources, lack of information about the services and

products, access credentials, poor internet connections and lack of access to computers.

Objective 2: To find out how e-resources effectiveness affects usage of digital repository.

The findings showed that effectiveness affects usage of digital repository. In the study, the respondents all agreed on the statements such as , being able to find information needed, the repository output being as expected, the content of the repository being accurate, the search results always relevant to the search query and the repository allows linkages to other informational sources.

Objective 3: To establish the effect of e-resources efficiency on the usage of digital resources by students in the University of Nairobi. The findings showed that efficiency affects usage of digital repository. The respondents were able to agree on statements such as it was to retrieve information, easy to navigate and easy to get online assistance.

Objective 4: To determine how user satisfaction with the e-resources affects usage of digital resources by students in the University of Nairobi. Despite the respondents agreeing on the statements about satisfaction on clarity of information, quality of indexing terms, quality of retrieval terms quality of searching options and amount of information retrieved, the quantitative finding denoted that this attribute does not affect usage of the digital repository. On the other hand, the qualitative finding did show that satisfaction does affect usage of the digital repository.

Objective 5: To find out the effect of e-resources awareness on the usage of digital resources by students in the University of Nairobi.

The respondents agreed on being aware of the Online catalogue, electronic books and journals but were undecided on awareness about the electronic database, e-newspapers and magazine, external database hence according to quantitative findings, awareness was not affecting usage of digital repository. Further, qualitative analysis revealed that lack of awareness affects the usage of digital repository. These included themes such as issues to do with orientation programs

that were unfulfilling, held in congested environment and by personnel who could not communicate well, staffing problems were ascribed to staff who are rude, incompetent and unwilling to help while student problems were related to problems emanating from the students themselves such as lack of interest, motivation and apathy by the student as well as access and availability of resources.

In conclusion, the quantitative and qualitative study found out that effectiveness, efficiency, satisfaction affects the usage of the digital repository. Critical issues include lack of training and awareness, inadequate resources such as computers, staff, difficulty in getting login credentials and passwords.

5.4 RECOMMENDATIONS

The recommendations are based on the results of research that has shown underutilization of the products and services. This calls for intervention by managers in the following areas;

The findings of the study offer several managerial implications. Importantly, university management needs to increase awareness of e-resources and the digital repository to create greater awareness among the users. To take cognizance of the usage drivers namely awareness, satisfaction and frequency and ease of use in order to make the necessary adjustments that can drive usage. Also to plan for increased information needs of the growing student base and master students who are bound to stretch the system when they all will have to begin to fully utilize it.

Another recommendation is the need to reduce the barriers and challenges that hinders usage of the resources, a barrier being a critical driver especially those that have been highlighted by the respondents. When barriers are broken down, usage will definitely increase for the library's portal. The identified barriers had to do with Student's inability to log on to the university, access from remote connection; - these are not new and continue to be a perennial problem.

The need to have personnel who are not only well trained but are focused, motivated and friendly and able to fulfill the needs of the students whenever they are approached cannot be underscored. Orientation should be meaningful and

useful and filled with knowledge that makes the student feel that it has been worth their while.

The study revealed that the policies governing effectiveness and efficiency are well implemented, thus the institution should keep enforcing use of such policies. And for users to be satisfied, they need to be aware and informed about the products and services. For this, there should be continuous awareness and training regarding use of digital repositories. This has been ably provided by the respondents who had innovative ideas on how they can be served in a way that makes their engagement with the e-resources and digital repository a rewarding experience.

5.5 SUGGESTIONS FOR FURTHER RESEARCH.

There is need to conclude a similar study among the other two user groups who were left out namely the lecturers and the staff so that a complete scenario can be modeled. Another similar study could endeavour to use a sample drawn from all the user groups categorized by the subject disciplines in the University of Nairobi.

E-resources are not new but digital repositories are very new and are just beginning to catch on in the country. There is therefore need for more studies covering all areas of usage. Comparative studies among user groups in the private universities can be carried out among user groups in the private universities to see if the findings will hold. This will provide a comprehensive conclusion and recommendation on policies that need to be put in place to ensure that public and private institutions of higher learning benefits from this innovative technology.

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APPENDICES

1. LETTER OF INTRODUCTION

Jane Achieng
University of Nairobi
P.O. Box 30197-00100
Nairobi
Dear Respondent,

RE: REQUEST TO FILL THE ATTACHED QUESTIONNAIRE

I am a Master student of Nairobi University, School of computing and informatics. I am currently doing my research work and would like to request your assistance in filling the attached questionnaire. The questionnaire has been designed to gather information on

"an analysis of the usage of a digital repository in an academic institution

The information you will present will be entirely for academic and learning purposes and will be treated with utmost confidentiality.

Thank you.

Yours faithfully,

Jane Achieng
Jane.achieng@uonbi.ac.ke

QUESTIONAIRES

1. Postgraduate: Attached: Questionnaire file
2. Undergraduate: Attached:Questionnaire file