

**CHALLENGES FACED BY LIBRARIANS IN IMPLEMENTATION OF FEDERATED  
SEARCH TOOLS: A STUDY ON KABARAK UNIVERSITY AND ST. PAUL'S  
UNIVERSITY**

**BY**

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AWARD OF THE DEGREE OF MASTER OF LIBRARY AND INFORMATION  
SCIENCE IN THE SCHOOL OF EDUCATION, KENYATTA UNIVERSITY.**

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**DECLARATION**

I confirm that this Project is my original work and has not been presented in any other university/institution. The project has been complemented by referenced worked duly acknowledged. Where text, data, graphics, pictures or tables have been borrowed from other works- including the internet, the sources are specifically accredited through referencing in accordance with anti-plagiarism regulations.

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## **DEDICATION**

To God for giving me the strength and good health I needed throughout my studies. I also dedicated it to my wife and my two sons, Enoch and Habakkuk, for the moral support I received from them.

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I am grateful to my supervisor, Ms Caroline Mutwiri, for the invaluable support and tireless guidance throughout the research and writing of this project. I am also grateful to the University Librarian who always allowed me to take my leave days/offers even on short notice and the library staff of Bishop Okullu Memorial Library who always stood for me.

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## ABSTRACT

Librarians' efforts to implement software that would help library users search multiple electronic databases simultaneously is faced by obstacles. This study therefore sought to identify challenges faced by librarians in selected academic libraries in Kenya in efforts to implement federated search tools. The objectives of the study were to assess ICT infrastructure, management support, policies, funding, and training and ICT skills in relation to implementation of federated search tools. The study is useful to academic libraries which are struggling to implement the federated search tools. The study used descriptive case study research design strategy. Purposive sampling technique was used to identify the participating Universities. The target population in the study was 30 library staff and 12 ICT staff from Kabarak and St. Paul's Universities. The study used a sample size of 34 library and university ICT staff. Questionnaires were used to collect data from selected respondents. Descriptive statistics such as percentages, pie charts, graphs, frequency tables were used to analyze data. Excel Spreadsheet was used to generate pie charts and graphs. The findings from this study established that the two academic libraries have not successfully implemented federated search tools and were facing challenges such as lack of adequate support from the university management, failure by the university management to allocate funds to support implementation of federated search tools, lack of policies to guide implementation, inadequate ICT skills and unreliable internet connectivity. The main conclusion drawn from this study was that the implementation of federated search tools has not been successful in the two academic libraries due to these challenges. The study recommends that there is need for the management to offer full support to ensure success of implementation, budgetary provision needs to be made, improve ICT infrastructure, especially the local area network and internet reliability, acquire further ICT training for staff and policies to guide implementation of federated search tools be put in place. This study will benefit librarians who intend to implement federated search tools as they will be able to understand what is required in order to successfully implement the federated search tools.

## **LIST OF ACRONYMS AND ABBREVIATION**

<b>ICT:</b>	Information Communication Technology
<b>INASP:</b>	International Network for Availability of Scientific publications
<b>KENET:</b>	Kenya Education Network
<b>KLISC:</b>	Kenya Library and Information Service Consortium

## CHAPTER ONE: INTRODUCTION

### 2.0 Introduction

This chapter gives a general background to the problem and an overview of the federated search tools. It also identified the objectives and significance of the study as well as the statement of the problem. Other areas covered include research questions, conceptual framework of the study, and definition of terms as well as assumptions in the study.

#### 1.1 Background to the Study

The mode of access to information is undergoing a great deal of transformation. To keep up with this trend, libraries are adopting systems that enable libraries to continue playing its critical role in ensuring that patrons access the information they require from the various sources of information at their disposal. This role can be achieved when there is an effective means of ensuring that these sources are accessible to the users in a most convenient way through provision of necessary information system. Devi & Devi (2006) notes that libraries achieve this role by facilitating information use by availing systems that navigates through all the information sources.

Information is increasingly available in electronic form and at the same time users are getting sophisticated. Web-based applications technologies are increasingly being adopted by libraries so as to provide information needed by library users are available online. The result of this is that library users access their information requirements through the internet. This is forcing libraries to ensure that information seekers access information in the most convenient ways. Thus libraries are finding themselves constantly searching for solutions that can accommodate the changing user needs.

Most research findings are published in various scholarly journals which in turn are availed by different publishers in the form of databases. The databases supplement reading materials (Fidzani, 1998) for students as they cover various topics taught in class. Indeed studies shows that students are turning to online resources as they are “easily accessed, fast, convenient and time saving” (George [et\_at], 2006). Therefore due to these facts, libraries need to implement solutions that facilitate the use of these databases in more convenient way.

Information seekers are faced with a large number of databases and other online resources due to information explosion. Israel (2010) refers information explosion as a “rapid increase in the amount of published information and the effects of this abundance of data”. It is the exponential growth of literature (Koenig, 1982). This exponential growth of literature has created a number of challenges to information seeker. Information explosion has resulted in inability for researchers to “keep up with the literature” (Koenig, 1982). Mishra (2008) notes some of the challenges associated with information explosion. One of the challenges identified is the case where library users are unsure of on which resources to use as it is difficult to search all the databases. It is also impossible to search all the databases accessible to a library user. The amount of literature available to users is becoming huge and therefore users are overwhelmed as to where to start from and end in search for information. There is also the challenge of time constraints as searching through a number of databases consumes a lot of time and can prove to be time wastage for information seekers. Lastly there is issue of library patrons having to learn different search interfaces considering the fact that every publisher have unique interface so as to be distinguished from the rest. Libraries are therefore forced to look for solutions that helps patrons navigate through the huge amount of information in user-friendly manner.

Academic libraries in Kenya subscribe to over 40 scholarly databases and two eBook publishers (“Kenya Library & Information Services Consortium,” 2013.). These categories of databases include, among others, ebscohost, sage, project muse, Jstor while eBooks include ebrary and Taylor and Francis. Each of these resources as of now is searched individually one by one by information seekers and this makes the process of searching information time-consuming and tedious. Libraries therefore have no choice but to implement a system which assist patrons to effectively make use of resources available to them.

Library policies plays critical role in library’s efforts to carrying out its intended activities. For libraries to be effective in executing their mandate, they need to have suitable policies. Policies put in place by different libraries ensure that proper procedure is followed in adoption and use of a given activity as they act as roadmap. Policies acts to create an enabling environment in which libraries can effectively fulfill their mandate. The Policies play a very important function as it give guidelines to be followed in acquisition, selection and implementation of a technology in the library. The presence of these policies ensures that diligent processes are followed in selection and use of a technology being adopted. It also ensures that the library gets the full support needed in terms of personnel, budgetary and infrastructure needed. One of the critical policies that libraries should have in place is the ICT policy. An ICT policy not only ensures that right infrastructure is in place, but also guide in selection of suitable software solution for every need in the library. This study sought to find out whether libraries have put in place appropriate policies that are required for effective implementation of federated search tools.

Information communication technology (ICT) infrastructure forms the pillars that support librarians’ efforts to deploy any appropriate library systems. Effectiveness of any system

depends on the reliability of ICT infrastructure that is in place. Infrastructure is therefore very critical to the library as it forms a backbone to any information technology development. Like any other information technology project, implementation process for federated search tools requires some basic infrastructure in the form of hardware and software. These include servers, internet connection, and networked environment. The most critical infrastructure needed for implementation of federated search tools is server as it forms critical equipment for the project. Availability of the necessary ICT infrastructure can help address the challenges that libraries may face in implementation process of federated search tools. This study therefore sought to find out whether academic libraries have in place the appropriate ICT infrastructure.

Libraries depend on budgetary allocation to run its operations and support its projects implementation plans. Funds always are limited as various activities in the library compete for allocation. Priorities and perceived importance of an undertaking informs which activities get a support. Libraries are expected to make heavy investment in terms of buying the necessary infrastructure, software and even engaging consultancy services during the implementation process. Successful implementation of federated search tools to a great extent depend on budgetary support it receive from the library. This study therefore sought to find out whether academic libraries are allocated adequate budgetary allocation to enable them carry out implementation of federated search tools.

Training, as a critical component in the implementing a project, determines the level of success. Library staff needs to embrace and own any new tool that library acquires and this can be achieved by conducting training. Wilson (2003) emphasized the need for training for library staff that supports the library systems. This ensures that the library staff is “up-to-date on the design, functioning and management of the particular network installed” (Wilson, 1998). This

ensures that library staff is in a position to understanding the workings of a system and be able to pass on the knowledge to the library users. This study therefore sought to find out whether the selected academic libraries have personnel who have the necessary ICT competencies to be able to implement federated search tools.

The role of information communication technology (ICT) staff is also vital when rolling out a technology in the library. Their skills are becoming very critical if libraries are to fully benefit from the advancement of technology. Gordon (2003) notes that “technology is interwoven throughout library operations that systems librarians are essential in ensuring that technology always serves the needs of the institutions”. He further adds that “if library lacks systems support technology may fail to meet institution’s needs” The ICT competencies are highly needed not only during the implementation period but also for continuous maintenance of the systems. Wilson (1998) identifies critical areas that librarians in charge of ICT should possess so as to be effective in performing their tasks of overseeing successful implementation, maintenance and training of library systems. These areas include library automation, computing and networking. Depending on the different models, libraries are either supported through University ICT department or libraries have dedicated ICT staff within the library. Where libraries depend on its own staff to implement new technologies, library staff in charge of ICT is required to have the necessary competencies in the area of information technology. This ensures that rollout of technologies are successful. Regardless of the model, ICT expertise must be harnessed to enhance access to information.

Information technology is continuously evolving as new discoveries and enhancement of existing software are unveiled. The tools which have come out as results of technological



advances have made it possible for patrons to access to information through different models. Information technology is becoming a driving force for every activity in the library. This trend has seen libraries use information technology to address various needs of the users. Advances in technology have led to discovery of tools that can help researchers retrieve information they require (Bear, 2004). Such systems aid researchers retrieve information across multiple databases.

In developed countries, federated search tools have been in use for over a decade now (Boock, 2006). University libraries in developed countries started using federated search tools as early as 2004 (Jiang, 2008). According to Boock, Oregon State University library evaluated several federated search products to implement which led to implementation of MetaFind in 2004. In Africa, documented evidence of successful implementation of federated search products is few. Evidence shows that a number of Universities in South Africa, for instance University of Pretoria (Becker, 2004). National university of science & technology library, Zimbabwe has also successfully implemented federated tools (Kujenga, 2011).

At regional level there are efforts being done to ensure that academic libraries implement federated search tools as a measure of enhancing the use of electronic resources (Kujenga, 2012). eIFL.net is making its contribution contributions felt on implementation of federated search tools through its workshops. In December 2012 they organize a workshop in Dar es Salaam, Tanzania which attracted participants from East and Central African region (eIFL.net) with objectives of empowering ICT librarians on implementation of SubjectsPlus, a leading platform for implementing federated search tools.

This study sought to establish the challenges encountered in implementation of federated search tools at selected academic libraries in Kenya. There is an also consistent effort to impart information communication technology skills to librarians in Kenya through workshops organized by International Network for the Availability of Scientific Publications (INASP), a cooperative network of partners whose shared mission is to enhance the flow of information within and between countries (Rosenberg, 2006).

Though such workshops have created awareness and empowerment of ICT librarians it has not directly resulted in successful implementation of federated search tools, it is creating awareness on the need for academic libraries to implement federated search tools.

Thus there is still a gap in successful implementation federated search tools among academic libraries. Hence this study investigated the challenges that are faced by academic libraries in implementation of the tools.

## **1.2 Statement of the Problem**

Federated search tools are invaluable systems that are meant to help library patrons search across all the subscribed electronic resources from a single search box. Successful implementation of these tools helps address problems associated with the existing scenario whereby information seekers are faced with difficulties in deciding which resources among the subscribed ones have information they are seeking to retrieve. In the absence of federated search tools library users are forced to search for information from one database after another. This makes it difficult for them to choose which resource to use. They are also faced with different search interface with each resource requiring users to follow different steps when searching information in them. Library users find the interfaces each of the resources subscribed by libraries to be too complex (Chibini, 2011). Learning and understanding each of these interfaces can be challenging too many of the

library users. Library patrons waste valuable time when searching for information from one database after another. Due to challenges associated with use of databases, students opt to use other search engines as Google which are unregulated in terms of content.

To address the existing situation, federated search tools, which would help information seekers search multiple databases at ago, have been developed. Despite the tremendous features that these tools have in aiding information seekers locate and retrieve information across the databases, their implementation in academic libraries in Kenya appears to be low for reasons yet to be documented. This study sought to find out the reasons for that.

### **1.2.1 Purpose of the Study**

The purpose of the study was to enable researcher determine the challenges faced by academic libraries in Kenya in efforts to implement federated search tools in order to improve dissemination of information that would be help to institutions that are intending to implement federated search tools.

### **1.3 Objectives of the Study**

The study sought to achieve the following specific objectives:

1. Establish the stage at which selected academic libraries were in with regard to implementation of federated search tools.
2. To find out the kind of support the libraries received from university management in implementation of federated search tools.
3. Determine whether libraries had adequate budgetary allocation to finance implement federated search tools.

4. Find out what policies libraries had put in place to be followed in the implementation of federated search tools.
5. Established whether the selected academic libraries had appropriate information communication technology (ICT) infrastructure needed for implementing Federated search tools.
6. Find out whether librarians had adequate ICT skills and training to implement and manage the federated search tools once they are in place.

#### **1.4 Research Questions**

The study sought to answer the following research questions:

1. What steps have your library taken toward the establishment of federated search tools?
2. What kind of support have library received from the management in its efforts to implement federated search tools?
3. What proportion of the library budget is allocated to implementation of federated search tools?
4. What policies have libraries put in place to ensure successful implementation of federated search tools?
5. What ICT infrastructure has been put in place to facilitate implementation of federated search tools?
6. What ICT skills and training do librarians in charge of implementation of federated search tools possess?

## **1.5 Significance of the Study**

Academic libraries will benefit from the study as they will be able to comprehend of what is required in implementation of federated search tools successfully. With such understanding, libraries will be prepared to undertake successful implementation of federated tools.

Library patrons will be the most beneficiaries as they will find it easier to search and retrieve information across multiple electronic resources once academic libraries implement these tools as they will be able to access multiple electronic resources using single search box.

## **1.6 Scope and Limitations**

### **1.6.1 Scope**

The study covered only the aspect of implementation and therefore did not cover the aspects of selection and use of federated search tools.

### **1.6.2 Limitations**

The study was conducted in only two academic libraries and data was collected by researcher using questionnaires and interviews only.

## **1.7. Assumptions**

The study was based on a number of assumptions. These include:

- Each academic library has adopted federated search tools to ensure the resources they subscribe to are accessed with ease through the implementation of federated search tools
- Libraries have implemented federated search tools.

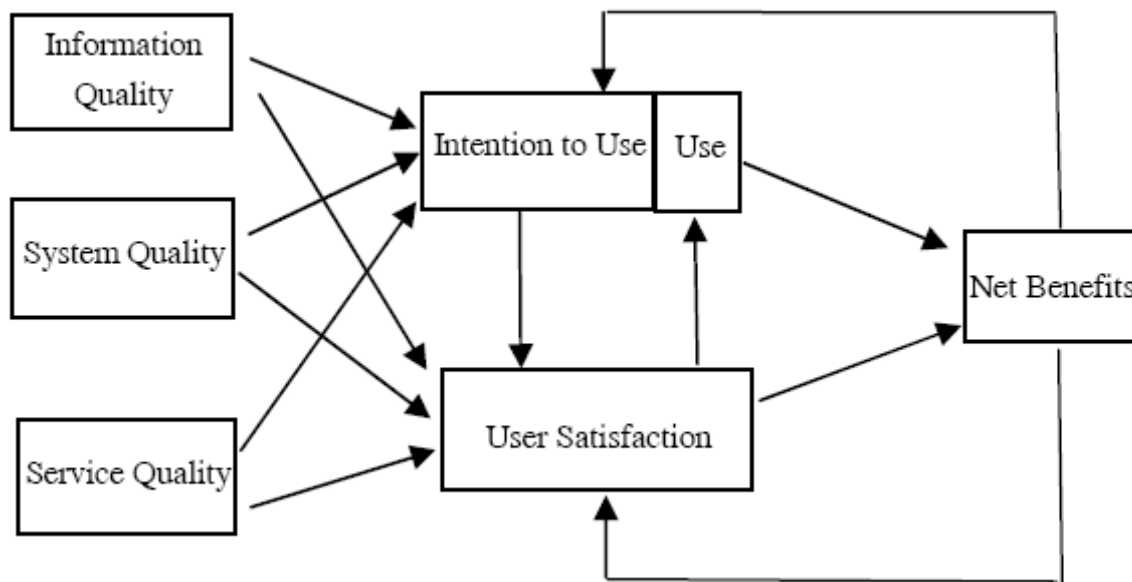
## **1.8 Theoretical Framework**

The theoretical framework that was used to guide this study is DeLone and McLean Model of Information Systems Success as advanced by William H. DeLone and Ephraim R. McLean (DeLone & McLean, 2003). The model was developed in 1992 and updated in 2003 with the aim of aiding researchers carrying out studies in the field of information systems (DeLone & McLean, 2003). The Model identifies six dimensions that are critical for the success of implementation of an information system. These include system quality, information quality, service quality, system use, user satisfaction and Net Benefits (Wade, Schneberger & Dwivedi, 2012). The model serves to ensure that as institution implement an information system; they put into focus the overall goals of the system. The model ensures that important factors such as customization, training, user requirements, cost, staff requirements and competencies as well as support are taken into considerations.

The Model was chosen as the topic under study is an information system and its successful implementation is influenced by some of the variables identified in the model.

A number of researchers have used the model in their studies. These include measuring online learning systems success (Lin, 2007), Measuring KMS success (Wu, 2006) and towards defining Knowledge management success (Janne, Smolnik & Croasdell, 2007).

This model guided the study in identifying the variables that affect the implementation of federated search tools in academic libraries. Federated search tool is an information system that helps students, faculty and other researchers to retrieve information from a number of databases through a single search.

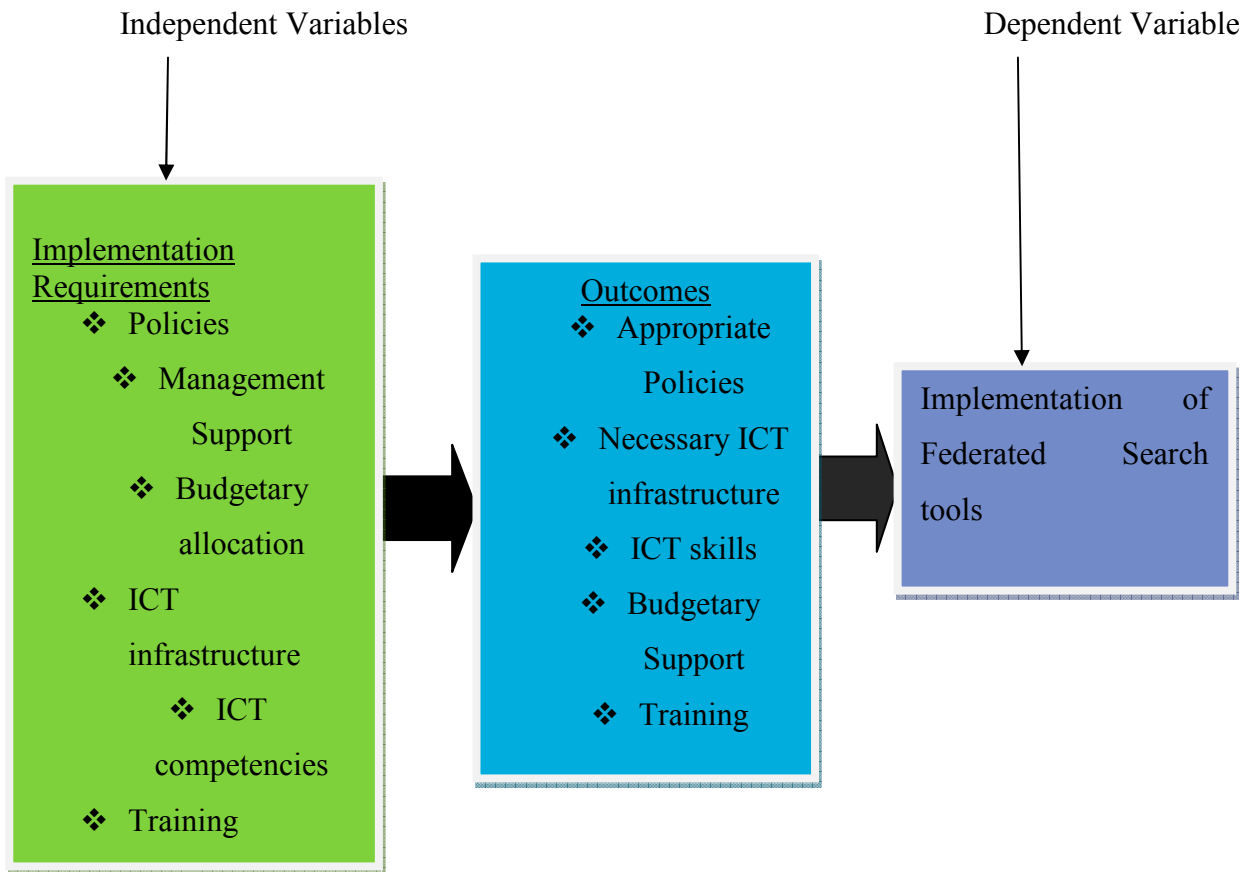


**Figure 1.1: The updated DeLone and McLean's 2003 Model**

**Source: Zaied (2012)**

## 1.8 Conceptual Framework

The relationship between various variables is shown in Figure 1.1 below



**Figure 1.2: Conceptual Framework.**

**Source: Researcher**

From Figure 1.2 above implementation of federated search tools depends on a number of factors.

ICT infrastructure forms the backbone in which federated search tool are implemented. They



include server, networked environment, internet connectivity, and computers. Budgetary allocation also affects the success of implementation process. Libraries are required to invest in a number of resources and activities. The required hardware and software are required to be purchased; consultancy services may also be required. Formulation of policies that governs the establishment and the use of federated search tools are essential as it guides in the implementation process.

ICT skills are critical for implementation of federated search tools. ICT skills are required in the implementation process as well as in maintenance and use once the tools are operational.

Training is a key process as it ensures that the tools get acceptance by both the library staff and the library users. Library staff needs to understand the capability of the tools so as to pass them to the users.

In this study the dependent variable was federated search tools while the ICT skills, ICT infrastructure, budget, policies constituted the independent variables.

### **1.8 Operational Definition of Terms**

**Federated Search:** “Federated search is an information retrieval technology that allows the simultaneous search of multiple searchable resources. A user makes a single query request which is distributed to the search engines participating in the federation then aggregates the results that are received from the search engines for presentation to the user”. (Kakoli, Jyotika, & Mukut, 2012)

**Federated Search Tools:** Systems that search a collection of databases from one interface and present one set of results, thereby reducing the amount of time and energy that a researcher must

invest in using individual database interfaces. The system ranks search results from these many sources into a single user interface (Korah & Cassidy, 2010).

**Implementation:** The process of deployment of a new information system and making it available to a “prepared set of users and positioning on-going support and maintenance of the system within the Performing Organization” (Pataki, 2003).

**Online resources:** any information source that the library provides access to in an electronic format. Typical resources include electronic journals, online databases and eBooks (Rumsey, 2008).

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.0 Introduction**

This chapter discussed the literature related to implementation of federated tools activities in academic libraries; challenges and constraints that are faced in efforts to ensure that they are in place to help users in accessing electronic resources.

The literature review addressed areas related to challenges to implementation of federated search tools. The areas that were addressed included budgetary allocation, management support, policies, ICT infrastructure, ICT skills and training.

### **2.1 Federated Search Tools**

Afroz and Mahmud (2011) identified the various stages in the implementation of federated search tools. These stages include installation, acquisition of relevant information technology infrastructure, integration of various electronic resources, customization of interface, preparation of documentation and training. This study was helpful as it informed the researcher on stages that are followed in implementation of federated tools as it highlighted what is required for successful implementation of federated search tools. It also guided on what variable to look for in the study.

A number of studies have been carried out globally on federated search products in academic libraries. For instance, Young (2010) undertook a study aimed at evaluating and comparing federated search tools as the next generation catalogue. In his study, Young (2010) used 260 academic libraries in USA and Canada in an effort to identify the progress made to model current OPACS after the next generation catalogs. The study was not comprehensive in scope as it limited itself to the author's real experience on the federated search tools. This study was based

on academic libraries in developed countries that have the best infrastructure, including qualified personnel to implement federated software. The situation in Kenya may be different due to level of information technology in terms of infrastructure, skills and training.

Additionally Hill (2007) undertook a case study on which he discussed federated search engines implementation with aim of enhancing library services to users. The study provides a checklist for librarians when seeking to implement a federated search tools. Though the study offers invaluable information on implementation of federated search tool, its focus mainly is on highly technical aspects such as development of federated search tools. This study therefore sought to find out whether academic libraries in Kenya have the necessary skills to successfully implement such a system which requires high technical skills.

Boock (2007) made a study with the aim of describing the process of selection, configuration, implementation and assessment of proprietary search products. The study as is title suggests focused only on proprietary products and left out open-source products which can be used as alternative. The researcher hopes to full this gap by also looking at the possibility of using open-source software products as solutions to the stated problem. The choice of the software to be used may highly be influenced on the amount of budgetary support that an academic library is allocated.

Curtis (2005) put a case for the need of federated searching for academic libraries that have multiple electronic resources for its users. It discusses the need for hybrid library that have print and collection to use federated search products to assist users access these resources faster.

However the article does not cover sufficiently on the implementation of federated search products and therefore the need for this study.

Regionally a number of studies have been done which partially covers some aspects of the federated searching and tools. Mutula (2004) study on IT diffusions in Sub-Saharan Africa shows how some libraries have used ICTS to provide relevant local content to users. He showed how universities were using OPAC to provide access to several full-text journals. The study did not cover what is involved in the implementation of software that facilitates such access. This study aimed to fill that gap.

## **2.2 Library Funding**

Libraries naturally depend on the parent institution to finance the various operations under its mandate. However, in practice, libraries' allocations to projects are highly inadequate, and various undertakings have to compete for the limited resources. Libraries receive allocation below the projected amount needed to fund various activities that libraries would like to carry. They are therefore forced to limit the projects they can undertake. Like any other library projects, for federated search tools to be implemented it requires financial support from the library.

In the study "Library funding in Nigeria: past, present and future" Akporhonor (2005) discusses how libraries are funded in Nigeria. The purpose of the study was to document current sources of revenue for Nigerian Libraries and identifies and suggests other sources of funding. The study was conducted in selected Nigerian University libraries. The study made the following findings:

- Libraries derive funds from parent institutions
- Most libraries receive fewer funds than requested, that is, they are allocated below their projected budget.

- Public universities allocate up to 10% of grants received from the government to the operations of university libraries.
- These allocations are hardly adequate to finance all the desired operations. The chunk of funds allocated goes to purchase of books.
- The study indentified other alternative sources of funding to libraries such as miscellaneous fees, library fees, grants, endowments, profit levies, consulting, and fee-based services, among others.

The study however does not identify critical areas that are underfunded or does not receive any allocations in the library. This has led to situation where most funds go towards buying of books and journals but ignore critical area of funding technological innovations. The study has not addressed how the funds are allocated among the competing interest in the library.

Though the study recommends libraries to consider alternative sources of funding, it should be observed that the core services of libraries are to offer services to users and any other activity should be secondary.

The study concluded that libraries are often allocated insufficient fund. This forces library to carry out fewer projects and one area which always suffers is information technology. Therefore some projects such as implementation of federated search tools may be shelved aside. Funding is therefore considered a factor in successful or failure in implementation of federated search tools. This study aimed to establish allocation of funds for federated search tools and its effects on implementation.

In addition, Kavulya (2006) carried out a study “Trends in funding University Libraries in Kenya”. The purpose of the study was to investigate “recent trends in funding and collection

development” in University libraries in Kenya. The study involved data collection from selected University libraries.

The study identified categorizing of services, costing, allocating revenue to resources and activities as key funds in allocation of funds. The author notes that financial support for library development as not only inadequate but also lacking in coordination. Budgetary allocation in libraries needs to capture capital expenditure which includes installation of automated systems among others (Kavulya, 2006).

The study employed survey method in the form of statistical forms and questionnaires. The participants were University Librarians from the selected libraries.

The study identified key findings in the study which include the following:

- Funding in public Universities has continued to decline resulting in reduced budgetary allocations to the libraries. However the study shows that funding for the private universities have been consistent.
- The findings also showed that most libraries do not allocate funds for automation projects.

The study concluded that inadequate funding, especially in public university libraries has affected service delivery.

The study recommends that libraries take proactive role to influence financial allocations to libraries and introduce a more systematic approach to allocation of resources on priority basis as this leads to inclusion of automation projects such as federated search tools implementation.

The study despite offering important findings and recommendations did not show how university libraries prioritize the allocation of funds. This could have addressed issues of non-allocation or inadequate allocation of funding to automation projects such as federated search tools.

A study on “innovative financing for Universities libraries in sub-Saharan Africa” was carried out by OKojier (2010). The study identifies challenges faced by libraries in looking innovative financing that would supplement what they funds received from the parent institution.

The purpose of the study was to “review different sources of financing University libraries in Africa and the challenges faced by theses libraries in sourcing for funds” (Okojie, 2010).

The study was conducted in selected academic libraries in sub-Saharan Africa. The researcher carried out a review of literature on the subject, analysis of data collected and interviews.

The study came up with a number of findings which include:

- Governments provide averagely 90% of the funds for Universities libraries in Africa.
- Funds allocated to libraries are always inadequate
- Funds when provided are done in an adhoc basis
- There is need for libraries to seek alternative sources of funds
- Libraries need to recognize the need to invest funds in ICTs and IT professionals.
- Library budgets have been cut by inflations, cost of books and journals subscriptions
- Poor economic performance in different countries are affecting library funding
- Alternative sources of funding, for instant overdue fines, are insignificant

The study identified various ways in which academic libraries should adopt in raising deficit funds.



It recommends that libraries should be more creative to attract more funds by exploring alternative sources. The funds received from these alternative sources would then be channeled to library projects which rarely receive support from parent institution.

Despite the recommendations made in the study, the challenge that remains unanswered is how practical and adequate was these alternative resources and its impact on implementation of library projects such as federated search tools.

### **2.3 Policies**

Policies are put in place by different libraries to ensure that proper procedure is followed in adoption and use of a given process in undertaking a given activity. The policies helps create an enabling environment in which libraries can effectively fulfill their mandate. One critical policy that libraries should have in place is an ICT policy. This will not only ensure that the right infrastructure are in place, but also guide in selection of software solution for every library need.

Anie and Achugbue (2009) carried out a study on “library ICT in Nigerian Universities”.

The purpose of the study was to evaluate the “impact of ICT policies on Utilization of ICT resources and services”. The study was carried out in selected University libraries in Nigeria.

The participants included staff from each of the selected libraries.

The study employed survey methodology and questionnaires were used to collect data from respondents and analysis deduce from the collected data.

The study identified areas that should be covered by ICT policy such as “internet service provision, information technology equipments, networked information services” among others.

The study emphasized that ICT policies are put in place to enhance utilization of available “technological opportunities”.

In its findings, the study identified some of the advantages libraries had as a result of having ICT policies such as:

- Adoption of ICT policies make work easier and faster
- Enhance effective utilization of library resources
- Enhance library services

The study recommended that there was need to train and retrain library staff to utilize ICT for library operations. It also recommends that libraries be allocated adequate finances for development and operations.

Though the study highlights the need for libraries to have ICT policies, it failed to capture whether those libraries which have policy adhere to them. The challenge of implementing federated search tools are likely to be encountered if policies are not adhered to. Indeed Farrell (2007) reports that a number of institutions that have ICT policies in place lack resources to implement.

This study therefore sought to establish whether ICT policies do exist and whether they were helpful in implementation of federated search tools.

## **2.4 ICT Infrastructure**

ICT infrastructure is the key pillar in the process of implementation of federated search tool. This is due to the fact that ICT infrastructure forms the backbone from which the tools are setup. The infrastructures that support implementation of federated search tools include local area network, internet connectivity, servers and computers.

Mutula (2010) carried out a study entitled “the IT environment in Kenya: implications for libraries in public Universities”. The study covers developments in information technology sector in Kenya and its implication to libraries. The study appreciated the fact that there have been “clamor for rapid rise in the application of computers” in Universities (Mutula, 2001).

The study identified factors hindering implementation of new Information technology as:

- Shortage of funds to meet the costs of new technology and training
- Lack of well-articulated vision by the university regarding what they wish to achieve through technology.
- Shortage of computing skills

The study also indicated that universities lack implementation strategies for information technology which have led to issues such as creativity of ICT, training requirements, staff motivation largely uncoordinated. The study also found out that absence of ICT model that could guide universities in embracing IT has contributed to the up-take of information technology (Odini, 1999). According to the study, acquisition of hardware remains a challenge in academic libraries, resulting in procurement of incompatible hardware.

The study also noted inability of universities to take advantage of the country’s “developed information technology infrastructure to support the IT opportunities that are available”.

The study offered a number of suggestions that needed to be addressed in order to take full advantage of existing infrastructure. These include:

- Developing viable operational information policies
- improve local area networks

- libraries should increase cooperation and collaboration with computer and information systems professionals
- apportion Information technology resources equally

This study therefore sought to examine into availability of some of the suggested ICT infrastructure that is needed for successful implementation of federated search tools.

Another study carried out by Kenya Education Network (KENET) revealed the status of ICT infrastructure in Kenya's higher education institutions through the report entitled: "E-readiness survey of higher education institutions in Kenya". The purpose of the study was to assess the level of preparedness of the higher education institutions for using ICTs in teaching, learning, research and management in Kenya.

The study concluded that though "university community in Kenya was ready to use ICT for learning, teaching research and management, institutional leadership does not yet consider ICT a strategic priority for their institutions" (Kashorda, 2007).

As a result ICT was allocated inadequate funds for campus networks.

The study recommended a number of actions for institutions for ICT infrastructure to be effectively implemented and harnessed:

- increase internet bandwidth
- increase ratio of networked PC's to students
- Hire and retain highly skilled technical staff enhance off-campus access to library resources.
- Invest in frequent ICT professional training.

The study therefore sought to find out the existence of some of the infrastructure recommended above as implementation of federated search tools depends on ICT infrastructure.

## **2.5 ICT Skills among Librarians**

Libraries are increasingly recognizing the important role played by Systems/ICT librarians. This is due to increase use of information technology to manage various services in the library. In recognition of this development, the study attempts to investigate whether the current staff in charge of ICTs in the library has the necessary skills to implement and manage any automation project. According to Jordan (2003) systems librarian is a person “who is responsible for managing the information technology used in a library”. Systems librarian therefore holds a critical role within the academic library through overseeing the computer technology serving the library staff and patrons (Foote, 1997).

In the study entitled “what do employers expect?: educating systems librarian” Xu and Chan (1999) explores the critical role of systems librarians in systems implementation.

The purpose of the study was to investigate job responsibilities and qualifications of systems librarians in the United States.

The methodology employed in the study was to analysis of job advertisements for systems librarians in US libraries. A total of 133 jobs advertisements appearing in reputable publications were selected for the study to determine the skills, roles and qualifications required by employers of systems librarians.

The study acknowledges that with implementation of library and information services across computer networks, the role of systems librarians continues to grow. It further appreciates the fact that relevant skills affect the professional performance and development of systems librarians.

The study identified critical role of systems librarian as:

- Automation duties
- Management of library's integrated systems
- Computer hardware
- Software installation and maintenance
- Local Area Network administration
- Training library staff

It also identified the skills required of systems librarian required to effectively carryout their duties. These skills include:

- Work experience in area of technology
- Knowledge of hardware and software platforms
- Computer-related skills
- Operating systems
- Telecommunications
- World wide web

The study concluded that development of Information technology have great influence in job duties, requirements and skills of systems librarian. It recognizes the expanding responsibilities and knowledge requirements of for systems librarians and their core technical requirements.

The limitations of the study however need to be taken into account. The major one is being the study was based on developed country which is advance in technology. It is highly unlikely whether persons with the same skills are adequately available in developing countries like Kenya.

## **2.6 Training**

Training is critical factor in implementation of any information system such as federated search tools as it “makes users comfortable with the system and increase expertise and knowledge level of the people” (Bhatti, 2005). There has been consistent efforts to impart information communication technology skills to librarians in Kenya through workshops organized by International Network for the Availability of Scientific Publications (INASP), a cooperative network of partners whose shared mission is to enhance the flow of information within and between countries (Rosenberg, 2006). INASPs have recognized the role played by ICT professionals who often work behind the scenes; to provide working access to the Internet, a functioning website and online information database as well as ensure that a functional, properly maintained and upgraded computer is available. Alemneh (2006) also notes that due to improvement in available training opportunities, the quality of technical training in Africa is slowly getting better.

A number of institutions are taking up the challenge of equipping ICT librarians/systems librarians through capacity building workshops. In these workshops hosting institutions invite participants from other librarians. In 2009 St. Paul’s University hosted a workshop on Linux and MySQL training (Ndegwa, 2009). This was followed by KENET (KLISC, 2010) and Inorero (2011).

This study therefore sought to establish if these efforts to empower librarians in charge of ICT are bearing fruits, in terms of implementation of software in libraries.



## **CHAPTER THREE: METHODOLOGY**

### **3.0 Introduction**

This chapter focused on the methodology that was used by the researcher in the study. It explored on issues of research design, study population, sampling and instruments to be used for the research and method of data collection and analysis in an effort to capture relevant data to enable researcher evaluate the challenges faced by academic libraries in Kenya in efforts to implement federated search tools.

### **3.1 Research Design**

This study used descriptive case study design as it is suitable in situations where fact finding and existing state of affairs are required (Phophalia, 2010). This design therefore enabled the researcher to collect data on issues related to challenges to implementing federated search tools as they are at present in the selected academic libraries through the use of questionnaires and interview sessions. Through the descriptive design, the researcher was able to collect data that was used to describe the state of affairs and gain deeper insight on various challenges that are encountered by academic libraries in their efforts to the implementation of federated search tools in selected academic libraries.

### **3.2 Variables**

#### **3.2.1 Dependent Variables**

In the study, the dependent variable is federated search tools. These are the software that facilitates library patrons to search across all the databases from a single search box.

### **3.2.2 Independent Variables**

In the study the independent variables include policies, management support, budgetary allocation, ICT infrastructure, ICT skills and training while dependent variable is federated search tools implementation.

ICT infrastructure forms the backbone in which federated search tool are implemented on. They include server, networked environment, internet connectivity, and computers. Budgetary allocation also affects the success of implementation process. Libraries are required to invest in a number of resources and activities. The essential hardware and software are required to be purchased; consultancy services may also be required. Formulation of policies that governs the establishment and the use of federated search tools are essential as it guides in the implementation process.

ICT skills are critical for implementation of federated search tools. ICT skills are required in the implementation process as well as in the maintenance and use once the tools are operational.

Training is a key process as it ensures that the tools get acceptance by both the library staff and the library users. Library staff needs to understand the capabilities of the tools so as to pass them to the users. Management support is another variable that plays a major role in successful implementation of federated search tools.

### 3.2.1 Location of the Study

This study was carried out in selected academic libraries in Kenya. It was specifically carried out in Kabarak University and St. Paul's University. The study location was based on academic libraries which have started the implementation of federated search tools.

### 3.3 Target Population

The target population for this study included 30 librarians and 12 ICT staff from Kabarak University and St. Paul's University, hence a total of 42 staff.

**Table 3.1: Target Population**

	University Librarian	Senior Librarians	Assistant Librarians	Senior Library Assistants	Library Assistants	Library Attendants	University ICT Department	Total
Kabarak University	1	1	1	5	4	1	6	19
St. Paul's University	1			8	7	2	8	26
								42

### 3.4 Sampling Techniques and Sample Size

#### 3.4.1 Sampling Techniques

The study used purposive sampling technique. The choice of purposive sampling technique was guided by the fact that it allowed the researcher to select cases that have the required that gave most information sought (Mugenda & Mugenda, 2003). This strategy was also used so as to get



### **3. 5 Research Instruments**

The study used questionnaires and interview schedules.

#### **3.5.1 Questionnaire**

Questionnaires was used as it provided a standardize format for respondents. Questionnaires were designed based on the proposed study and the respondents were required to write responses to the questions. The responses were be coded to create codes and scales from the responses which were used to summarize and analyze data in various ways. The questionnaires were administered to the selected respondents.

#### **3.5.2 Interview Schedules**

Interview schedule were used to ensure that questions were asked in a predetermined order and format to each of the respondents. Use of interview schedule selected in order to ensure that data were collected based on the objectives of the study. The questions sought to answer the challenges faced by academic libraries in efforts to implement federated search tools. Structured interviews are advantageous because the reliability of the information gathered is high since respondents are subjected to the same questions (Fontana & Prokos, 2007). It also gives in-depth information about a particular issue before moving since the respondent simply answers what has been asked by the researcher.

### **3.6 Pilot Study**

Pilot study was carried out at Presbyterian University of East Africa before the actual commencement of data collection. From preliminary investigations, Presbyterian University of East Africa is one of the Institutions which have started implementation of federated search tools.

The purpose of carrying out the pilot study was to pre-test the reliability and validity of data collection instruments to be used in the study. The pilot study was done to test the interview schedules, questionnaires and effectiveness of observation in the study. In the pilot study interview was conducted with the University Librarian, ICT/Systems librarian, and librarian in charge of electronic resources, University ICT administrators. Questionnaires were distributed to the same respondents.

#### **3.6.2 Validity**

Validity was ensured by using descriptive research design which is the most relevant for the study. Interviews, questionnaires were used in data collection to ensure that information gathered is valid. Data once collected were analyzed using the most suitable means.

#### **3.6.2 Reliability**

Reliability was ensured by ascertaining that the data collection instruments are edited so that they are comprehensible to the respondents. From the pilot study it was possible to check for consistency in responses. Questions were also be phrased using clear and unambiguous so as to ensure reliability of the tools to be used.

### **3.7 Data Collection Techniques**

The researcher personally distributed the questionnaires to the respondents and collected after they were filled. The participants were given adequate time to provide answers contained in the questionnaires.

### **3.8 Data Analysis**

To facilitate analysis of qualitative data, coding frames were developed based on the themes which emerged. Data was then be categorized based on these themes and each interview assigned a reference number.

Quantitative data were coded and organized according to the ordinal value so as to allow comparison from the respondents. Comparative analysis was done so as to capture the variations in the responses to questions were carefully examined. Descriptive statistic techniques such as percentages, pie charts, graphs, tables so as to make interpretation of data collected easier were used.

### **3.9 Logistical and Ethical Considerations**

Ethical issues were taken care of and addressed at the onset of the study. Participants were assured of certain rights; agreeing to be involved in the study and acknowledgement of their privacy protected. Also respondents were assured and guaranteed that the study findings and final report were for academic purposes but may be disseminated to the policy makers with no possibility of tracing responses to individuals to protect their confidentiality. Work or information used were acknowledged to avoid plagiarism. Permission was also sought from institutions' relevant authorities before commencement of collection of data.

## **CHAPTER FOUR: FINDINGS, INTERPRETATION AND DISCUSSIONS**

### **4.0 Introduction**

This chapter gives the results of the findings on challenges encountered by academic libraries in implementation of federated search tools. Data analysis was done by categorizing data collected based on themes of the objectives of the study. The research covered two academic libraries, St. Paul's University and Kabarak Universities as they were identified as universities who have attempted to install federated search tools. The results of data analysis are presented in tables, pie charts and diagrams.

### **4.1 Response Rate**

A total of thirty four questionnaires were sent out to be filled by respondents from both library and University ICT staff in the two universities. Out of these, twenty one were completed and returned to the researcher, thereby giving a response rate of 61.7%. 11 questionnaires out of 17 questionnaires distributed were returned at St. Paul's University and 10 out of 17 questionnaires were returned from Kabarak giving a response rate of 55.8%. In total the response rate of 61.7% was achieved.

### **4.2 Respondent Education Characteristics**

In terms of qualifications four of the respondents had Masters' degree, nine had attained graduate in library and information studies. Majority of the respondents from the two libraries occupies the position of Senior Library Assistant, while in University ICT department, majority were technicians.



**Table 4.1 Professional Qualification-St. Paul University**

<b>Professional qualification in the field of librarianship</b>	<b>Frequency</b>	<b>Percentage</b>
Diploma in library studies	2	22%
Higher National Diploma	0	0
1st Degree	5	56%
Masters	2	22%
PhD	0	0

The above table shows the educational qualifications of the respondents in St. Paul University, the majority were 1<sup>st</sup> degree holders at 56% while those with Masters and Diploma in library studies were 22% each.

**Table 4.2 Professional Qualification: Kabarak University**

<b>Professional qualification in the field of librarianship</b>	<b>Frequency</b>	<b>Percentage</b>
Diploma in library studies	2	33.3%
Higher National Diploma	0	0
1st Degree	3	50%
Masters	1	16.7%
PhD	0	0
other	0	0

The above table shows the educational qualifications of the respondents in Kabarak University, the majority were 1<sup>st</sup> degree holders at 50%, 33.3% with Diploma in library studies and 16.7% had Masters.

**Table 4.3: Summary of Respondents Based on Job Designations**

	<b>University Librarian</b>	<b>Senior Librarians</b>	<b>Assistant Librarians</b>	<b>Senior Library Assistants</b>	<b>Library Assistants</b>	<b>ICT Technicians</b>	<b>Total</b>
St. Paul's University	1	1		4	2	3	11
Kabarak University			1	3	2	4	10

### 4.3 Stage of Implementation of Federated Search Tools

The first objective of the study was to find out the progress at which each of the university under study were in regard to the implementation of federated search tools. To find out this, the respondents were asked to state the phase at which the two libraries were in the implementation of the federated search tools. The responses from are shown below:

**Table 4.4: Progress in the Implementation-Kabarak University**

<b>Responses</b>	<b>Frequency</b>	<b>Percentage</b>
Planning	2	33%
Selection of Software	0	0%
Customization	3	50%
Installation	0	0%
Testing	1	17%
Complete	0	0%

Majority of the respondents from Kabarak University (Table 4.4) indicated that they are still at the customization stage (50%), 33% respondents indicated that they were at planning stage and

17% indicated that they were at testing stage. None of the respondents indicated that they implementation of federated search tools were complete. The finding from these responses therefore shows that Kabarak University library is facing challenges at the customization stage.

**Table 4.5: Progress in the Implementation-St. Paul's University**

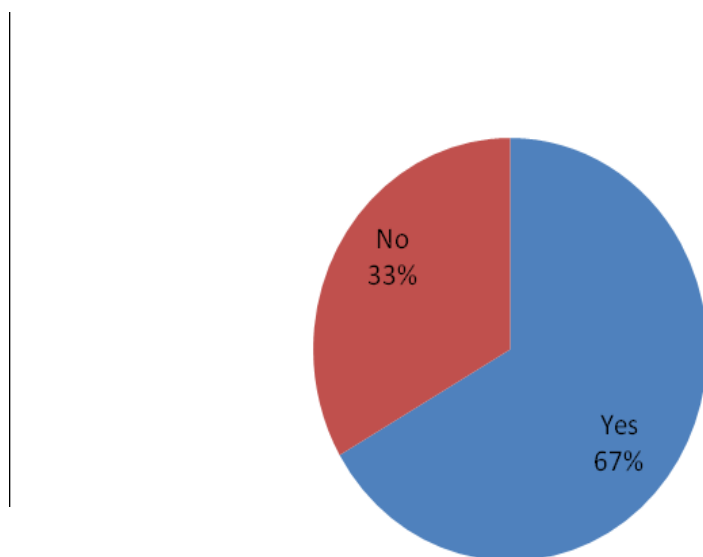
<b>Responses</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Planning</b>	1	12%
<b>Selection of Software</b>	1	12%
<b>Installation</b>	5	63%
<b>Customization</b>	0	0%
<b>Testing</b>	1	13%
<b>Complete</b>	0	0%

The Table 4.5 above shows the feedback from the respondents from St. Paul's University on the progress of implementation, 12% indicated that they were at planning stage, 12% at selection of software, 63% at customization phase and 13% indicated that they were on testing phase. None of the respondents indicated that they the implementation process was complete. This finding shows that the library has not managed to successfully implement federated search tools. Installation is one of the initial stages that are required to be overcome by the library in the implementation of federated search tools and therefore St. Paul's library had a long way to go in the implementation of federated search tools.

As indicated in the literature review, Afroz and Mahmud (2011) show that successful implementation of any software covers a number of stages, which include planning, installation, customization, testing, user training and maintenance. The fact that none of the academic libraries have gone through all the stages required to successfully complete the implementation shows that libraries are encountering challenges in implementing the software successfully. This study therefore shows that the two institutions have to overcome the entire challenges in these stages in order to implement federated search tools successfully.

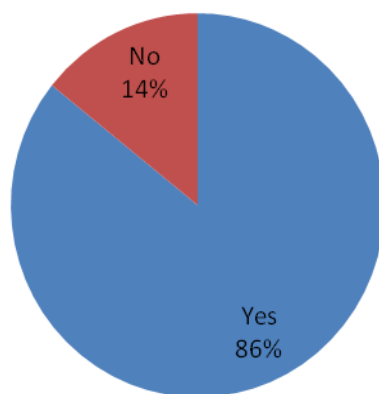
#### **4.4 Management Support in Implementation of Federated Search Tools**

The second objective of this study was to establish whether the selected libraries received the necessary support from the University management in its efforts to implement federated search tools. In order to determine whether the two academic libraries received adequate support from the management in its efforts to implement federated search tools, respondents were asked to state whether their libraries receive support from the library management. The responses from St. Paul's and Kabarak Universities are shown below on Figure 4.1 and 4.2 respectively:



**Figure 4.1: Respondents' View of Management Support-St. Paul's Univ.**

From responses from St. Paul's University as shown (Figure 4.1), 67% felt that they received support from management, while 33% indicated that no support was given. From those responses, it is worth noting that though majority of the respondents felt that library receive support from the University in implementation of federated search tools, there were respondents comprising of 33% who were of the view that libraries do not receive support. This divergent view may help explain why the library has not successfully implemented the tools. It therefore follows that lack of total support from the management in efforts by libraries is posing a challenge to successful implementation of the tools.



**Figure 4.2: Respondents' View of Management Support-Kabarak Univ.**

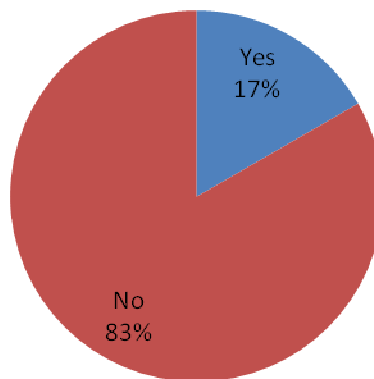
In the case of Kabarak University (Figure 4.2), 86 % indicated that they received support from University management while 14% believe that they did not receive support. Just as in the case of St. Paul's University, it is also worth noting that though majority (86%) of the respondents felt that library received support from the university management in implementation of federated search tools, there were 14% who were of the view that libraries did not receive support. This divergent view may help explain why the two libraries have not successfully implemented the tools and therefore lack of total support from the management in efforts by libraries is posing a challenge to successful implementation of the tools.

When asked what kind of support they received from management, 4 respondents from St. Paul's University indicated that they received support by creating awareness of the existence of federated search tools to university management while one indicated that they receive moral support. Two respondents from Kabarak indicated that they received support from management by creating awareness of existence of tools which can aid library users search information more effectively. These responses show that the management offers basic support and fails to support

in areas which are very critical for successful implementation of federated search tools such as campaign for budgetary provisions and ICT infrastructure.

#### 4.4.1 Oversight Committee

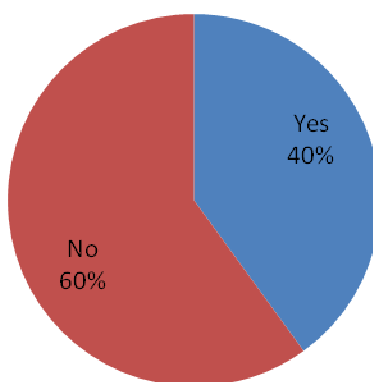
The study sought to establish whether there was a committee established by the two libraries to oversee the implementation of federated search tools. This was to determine whether the two libraries had an oversight committee that could help librarians in implementation of federated search tools. To determine whether there was committee to oversee the implementation of federated search tools, respondents were asked to state whether there is a committee that guides the implementation of federated search tools. Information on the presence of an oversight committee at St. Paul's University is presented on Figure 4.3 below:



**Figure 4.3: Presence of an Oversight Committee-St. Paul's Univ.**

83% of the respondents from St. Paul's university indicated that they did not have a committee that oversees the implementation of federated search tools.

On the other hand information on whether there was an oversight committee at Kabarak University is presented on the Figure 4.4 below:



**Figure 4.4: Presence of an Oversight Committee-Kabarak Univ.**

From Kabarak University 60% responses indicated that the library did not have a committee to oversee the implementation process.

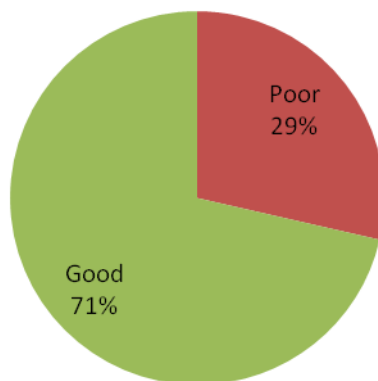
From responses, it evident that lack of a committee that would otherwise oversee the implementation of federated search tools in the two universities is detrimental to the successful implementation of the tools. Presence of a committee could not only monitor the progress of implementation but also act address issues that libraries encounter during the process of implementation. Such committee could be tasked with oversight role and therefore monitor the progress of implementation of federated search tools. The committee would therefore act as a bridge between the library and university management. Lack of such committee therefore has



contributed to failure to fully implement federated search tools. It also means that the task of implementation of federated search tools is left at the hands of ICT/System Librarian.

#### 4.4.2 Extent of Support from University Management

The study sought to find out the ratings of library management support towards implementation of federated search tools. This was to determine whether the support provided by the respective university management is adequate to enable librarians implement federated search tools successfully. Information on ratings of management support towards implementation of federated search tools at St. Paul's University is presented in Figure 4.5 below

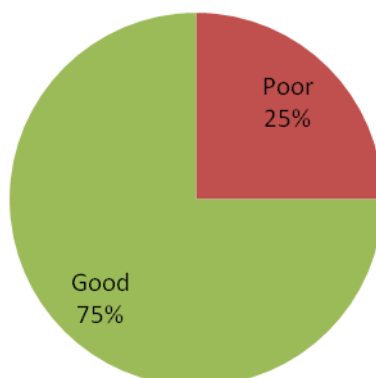


**Figure 4.5: Ratings of management support-St. Paul's University**

The respondents from St. Paul's University that 71% believed the support was good while 29% believe the support was poor. None of the respondents indicated that the report is very good or excellent.

Responses on ratings of university management of support towards implementation of federated

search tools at Kabarak University are presented in Fig.4.6 below:



**Figure 4.6: Respondents Ratings of Management Support- Kabarak University**

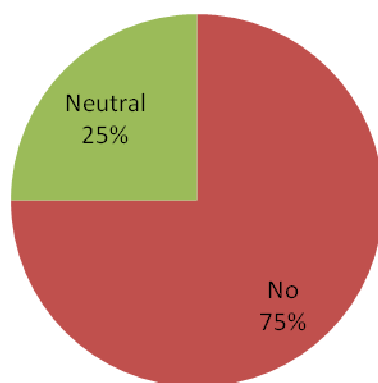
Respondents from Kabarak University indicated that 75% (Figure 4.6) believed the support was good while 25% believe the support is poor.

Though majority of the respondents in both institutions believed that they received support from the management there were those who believe that the libraries do not receive adequate support. In order for implementation of federated search tool to succeed, it requires total support from management which 21% and 25% of the respondents from Kabarak and St. Paul's University believe is lacking.

#### **4.5 Budgetary Allocation to implement federated search tools**

The third objective of this study was to determine whether libraries are allocated adequate funding through budgetary provision to enable them carryout implementation of federated search tools successfully.

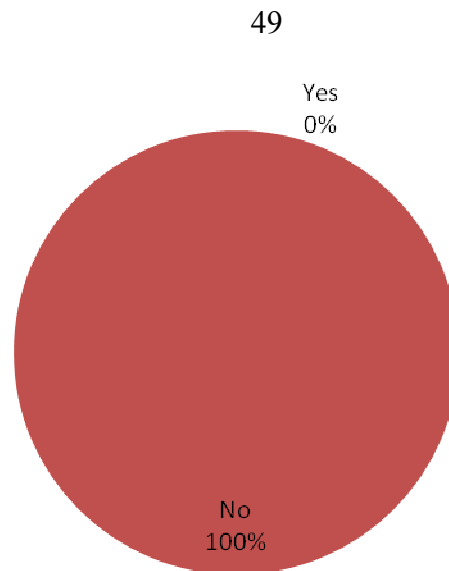
In order to find out whether libraries in the two universities were given budgetary allocations to finance the implementation of federated search tools, respondents were asked whether in the respective budgetary allocation, there is a provision for funds to support implementation of federated of federated search tools. Responses on the budgetary allocation from St. Paul's University are provided in the Figure 4.7 below.



**Figure 4.7: Budgetary allocation-St. Paul's Univ.**

The respondents from St. Paul's University indicated that 75% believed that there was no budgetary allocation for the implementation of federated search tools while 25% were neutral, that is, did not responded to this question. From these responses it is clear that St. Paul's University did not provide budgetary allocation for the implementation of federated search tools.

Responses from Kabarak University on provision of budgetary allocation for implementation of federated search tools is presented in Figure 4.8 below:



**Figure 4.8 : Budgetary allocation-Kabarak University**

It shows that all the respondents indicated that there was no budgetary allocation for the implementation of federated search tools.

From the responses it therefore shows that though libraries make budget which are submitted to the management for approval, they fail to include budgetary provisions for implementation of federated search tools. This finding is a clear indication that lack of funding has impacted negatively on the implementation of federated search tools. This shows that libraries have not given attention to issues of federated search tools the maximum attention it deserves.

#### **4.5.1 Areas Affected by Lack of Funding**

Respondents were asked to identify the areas that were affected by lack of funding. This was to determine the affects of lack of financial support to various areas of implementation of federated search tools. Responses were as indicated in Table 4.6 below:

**Table 4.6: Extent of Effects to Various Stages of Implementation Due to Lack of Funds**

<b>Areas</b>	<b>Installation</b>	<b>ICT infrastructure</b>	<b>Training</b>	<b>Others</b>
<b>St. Paul's University</b>	<b>32%</b>	<b>25%</b>	<b>32%</b>	<b>10%</b>
<b>Kabarak University</b>	<b>-</b>	<b>50%</b>	<b>50%</b>	<b>-</b>

From the table, the study revealed that 32% of the respondents from St. Paul's University indicated that lack of funds affected the installation of federated search tools, 25% indicated that it affected ICT infrastructure and 32% indicated that it affected training. On the other hand, responses from Kabarak University revealed that 50% of the respondents indicated that lack of funds affected ICT infrastructure and another 50% of respondents indicated lack of funds affected training.

From the responses, it is evident that failure to provide budgetary provisions by the selected libraries has impacted negatively on most stages of the implementation of federated search tools. These findings is supported by literature review where various studies shows that libraries are hardly allocated adequate funding as observed by Akporhonor (2005) and Kavulya (2005).

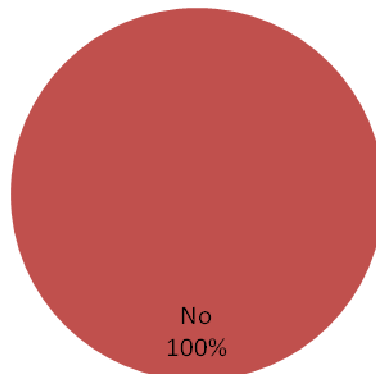
The findings showed that lack of funds for the implementation of federated search tools in the two academic libraries had affected the implementation of the tools at various stages.

#### 4.6 Policies Put In Place by Libraries

The fourth objective of this study was to investigate whether the selected academic libraries have put in place the necessary policies to guide in the implementation of federated tools and determine if such policy addressed the various aspects required to successfully implement federated search tools.

To establish whether the selected academic libraries had policies, respondents were asked to state whether they have policies to guide implementation of federated search tools and if available, which areas are addressed by the policies.

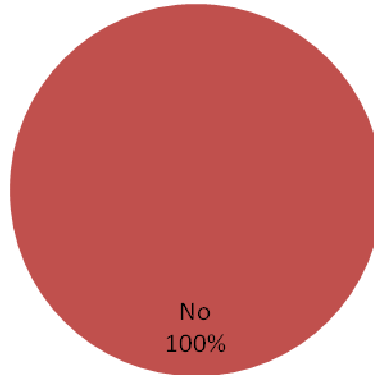
Information of presence of policies to guide implementation of federated search tools from St. Paul's University is provided in Figure 4.9 below:



**Figure 4.9 : Availability of Policies-St. Paul's University**

The respondents as indicated in the Figure 4.9, all (100%) believe that St. Paul's University did not have a policy to guide the librarians in the implementation of federated search tools.

Responses from Kabarak University on the presence of policies to guide implementation of federated search tools is shown on the Figure 4.10 below:



**Figure 4.10 : Availability of Policies-Kabarak University**

The findings shows that all (100%) of the respondents believed that there was no policy to guide librarians in the implementation of federated search tools at Kabarak University.

The responses from both universities gave a clear indication that there was no policy on implementation, use, training of users and support and maintenance of federated search tools. From this finding, it is indicative that the selected libraries' failure to implement the federated search tools has been contributed by lack of policy to guide the installation process. The finding also shows that these libraries are approaching the implementation of federated search tools in an adhoc basis as they do not have policies that should provide the road map to be followed in the implementation process.

Policies in place could serve as a critical tool not only to guide in implementation of but could also serve to provide a road map for every stage in the implementation process. It could also serve as a campaign tool for request for funds needed in the implementation. Lack of policy therefore means that issues such as installation, customization, training, use of federates search tools and even maintenance are not addressed and therefore leaves room for loopholes in efforts to implement the tools.

Ngimwa & Adams (2011) emphasizes that policies are crucial ingredients for initiating library projects through influencing project funding and therefore absence of policies contributes to failure to projects such as federated search tools. As indicated further by Anie and Achugbue (2009), it important for libraries to have relevant policies in the library so that such policies can guide in the implementation of federated search tools. A well formulated policy, if fully adhered to acts to guide the in issues such as adoption of ICT applications, enhanced utilization of library resources and hence effective service delivery.

#### **4.7 Information Communication Technology (ICT) Infrastructure for Implementing Federated Search Tools**

The fifth objective of this study was to establish whether the selected academic libraries have adequate ICT infrastructure to support the implementation of federated search tools.

To established the state of ICT infrastructure so as to determine if they were adequate to support the implement of federated search tools from the two Universities, responses were collected from both the University ICT department and library staff. The ICT department was included as they are responsible for provision of ICT infrastructure used by library.

Respondents were asked to rate the various ICT infrastructure which included servers, training facilities, Local Area Network, internet connectivity and other ICT infrastructure. The responses are capture in the tables shown below:



**Table 4.7: Ratings of Servers-St. Paul's University**

<b>Response</b>	<b>Frequency</b>	<b>Percent</b>
<b>Very Poor</b>	0	0%
<b>Poor</b>	6	55%
<b>Good</b>	3	27%
<b>Very Good</b>	2	18%

**Table 4.8: Ratings of Training Facilities-St. Paul's University**

<b>Response</b>	<b>Frequency</b>	<b>Percent</b>
<b>Very Poor</b>	0	0%
<b>Poor</b>	6	55%
<b>Good</b>	4	36%
<b>Very Good</b>	1	9%

**Table 4.9: Ratings of Local Area Network-St. Paul's University**

<b>Response</b>	<b>Frequency</b>	<b>Percent</b>
<b>Very Poor</b>	0	0%
<b>Poor</b>	6	55%
<b>Good</b>	4	36%
<b>Very Good</b>	1	9%

**Table 4.10: Ratings of Internet Connectivity-St. Paul's University**

<b>Response</b>	<b>Frequency</b>	<b>Percent</b>
<b>Very Poor</b>	0	0%
<b>Poor</b>	8	73%
<b>Good</b>	2	18%
<b>Very Good</b>	1	9%

Respondents from St. Paul's University on various ICT infrastructures were as follows: On the ratings of servers (Table 4.7), 55% of the respondents felt that the servers are poor, 27% good, and 18% very good. In the case of training facilities (Table 4.8), 55% of respondents rated them as poor, 36% indicated that they were good, while 9% of the respondents indicated that they were very good. On the ratings of the local area network (LAN) as indicated in Table 4.9, 55%

of respondents felt that the LAN was in poor state, 36% were of the opinion that the LAN is in good state while 9% stated that LAN was very good. On the issue of internet connectivity (Table 4.10), 73% respondents were of the opinion that internet connectivity was poor, while 18% and 9% felt the internet connectivity was good and very good respectively.

Respondents from Kabarak University also rated the various infrastructure and their responses are showed on the tables shown below:

**Table 4.11: Ratings of Servers-Kabarak University**

<b>Response</b>	<b>Frequency</b>	<b>Percent</b>
<b>Very Poor</b>	0	0%
<b>Poor</b>	5	50%
<b>Good</b>	5	50%
<b>Very Good</b>	0	0%

**Table 4.12: Ratings of Training Facilities-Kabarak University**

<b>Response</b>	<b>Frequency</b>	<b>Percent</b>
<b>Very Poor</b>	0	0%
<b>Poor</b>	2	18%
<b>Good</b>	6	55%
<b>Very Good</b>	2	18%

**Table 4.13: Ratings of Local Area Network-Kabarak University**

<b>Response</b>	<b>Frequency</b>	<b>Percent</b>
<b>Very Poor</b>	0	0%
<b>Poor</b>	2	22%
<b>Good</b>	6	67%
<b>Very Good</b>	1	11%

**Table 4.14: Ratings of Internet Connectivity-Kabarak University**

<b>Response</b>	<b>Frequency</b>	<b>Percent</b>
<b>Very Poor</b>	0	0%
<b>Poor</b>	5	50%
<b>Good</b>	4	40%
<b>Very Good</b>	1	10%

On the ratings of servers (Table 4.11), 50% of the respondents felt that the servers are poor, while the same percentage (50%) rated servers as good. In the case of training facilities (Table 4.12), 18% of respondents rated them as poor, 55% indicated that they were good, while 9% of

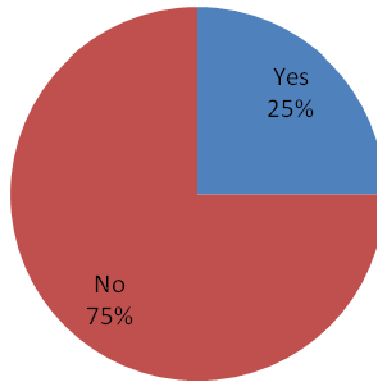
the respondents indicated that they were very good. On the ratings of the local area network (LAN) as indicated in Table 4.13, 22% of respondents felt that the LAN was in poor state, 67% were of the opinion that the LAN was in good state while 9% stated that LAN was very good. On the issue of internet connectivity (Table 4.14), 50% respondents were of the opinion that internet connectivity is poor, while 40% and 10% felt the internet connectivity was good and very good respectively.

From the ratings of the ICT infrastructure from the two institutions, it is evident both institutions have challenges in provision of the necessary ICT infrastructure. An earlier study on state of ICT infrastructure by KENET (KENET, 2007) is affirmed as it showed a number of academic institutions facing challenges in the acquisition of information technology. Okojie (2010) further argues that despite the availability of ICT infrastructure, African libraries have not fully exploited the advantages accorded by such infrastructure.

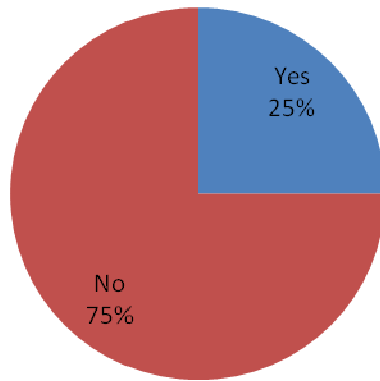
#### **4.8 ICT skills and Training**

The sixth objective of this study was to establish whether librarians have the necessary ICT skills and training required in order to carryout successfully implement federated search tools in the selected library. The study sought to find out the level of ICT competency of ICT staff in charge of implementation of federated search tools.

In order to find out, respondents were asked to state whether ICT staff had competencies that would enable them to implementation of federated search tools through the various phases. The responses are shown on the figures below:

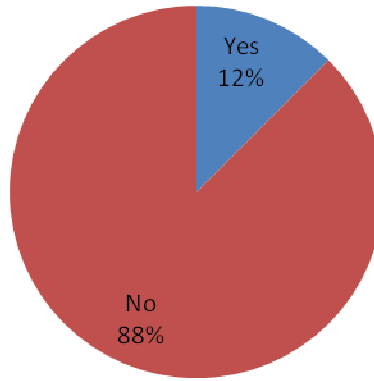


**Figure 4.11: Staff Competencies on Installation-St. Paul's Univ.**

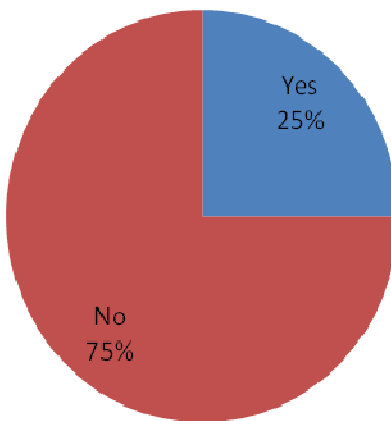


**Figure 4.12: Staff Competencies on Customization-St. Paul's Univ.**

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**Figure 4.13: Staff Competencies on Training-St. Paul's Univ.**

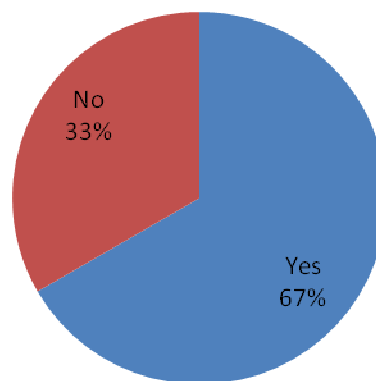


**Figure 4.14: Staff Competencies on Trouble shooting-St. Paul's Univ.**

From St. Paul's University, 75% (Figure 4.11) of the respondents believed ICT staff do not had competencies in installation of federated search tools, 88% (Figure 4.12) believe they do not have competencies in customization. 88% (Figure 4.13) of the respondents indicated that they do not have capabilities of conducting training to users, and 75% (Figure 4.14) of the respondents believed that the library were not equipped to perform trouble shooting.

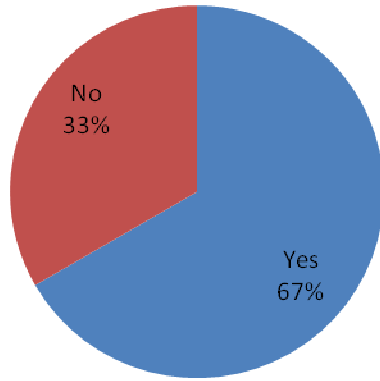
From the above responses, it shows that St. Paul's University has challenges in virtually all areas of implementation of federated search tools. It shows that the staff in charge of implementation of federated search tools does not have the required ICT competencies to enable them carry out the process through all the stages.

Responses from Kabarak University on competencies on library staff in charge of implementation of federated search tools are shown on figures below:

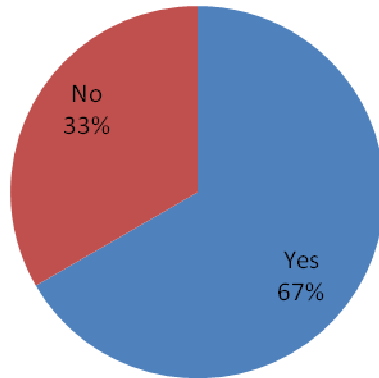


**Figure 4.15: Staff Competencies on Installation-Kabarak Univ.**

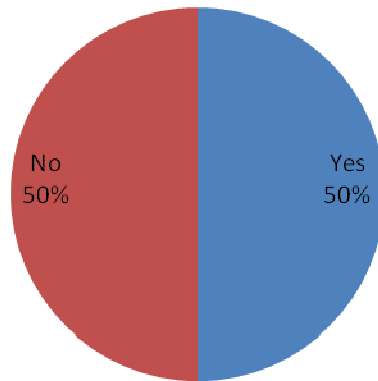




**Figure 4.16: Staff Competencies on Customization-Kabarak Univ.**



**Figure 4.17: Staff Competencies on Training-Kabarak Univ.**



**Figure 4.18: Staff Competencies on Trouble shooting-Kabarak Univ.**

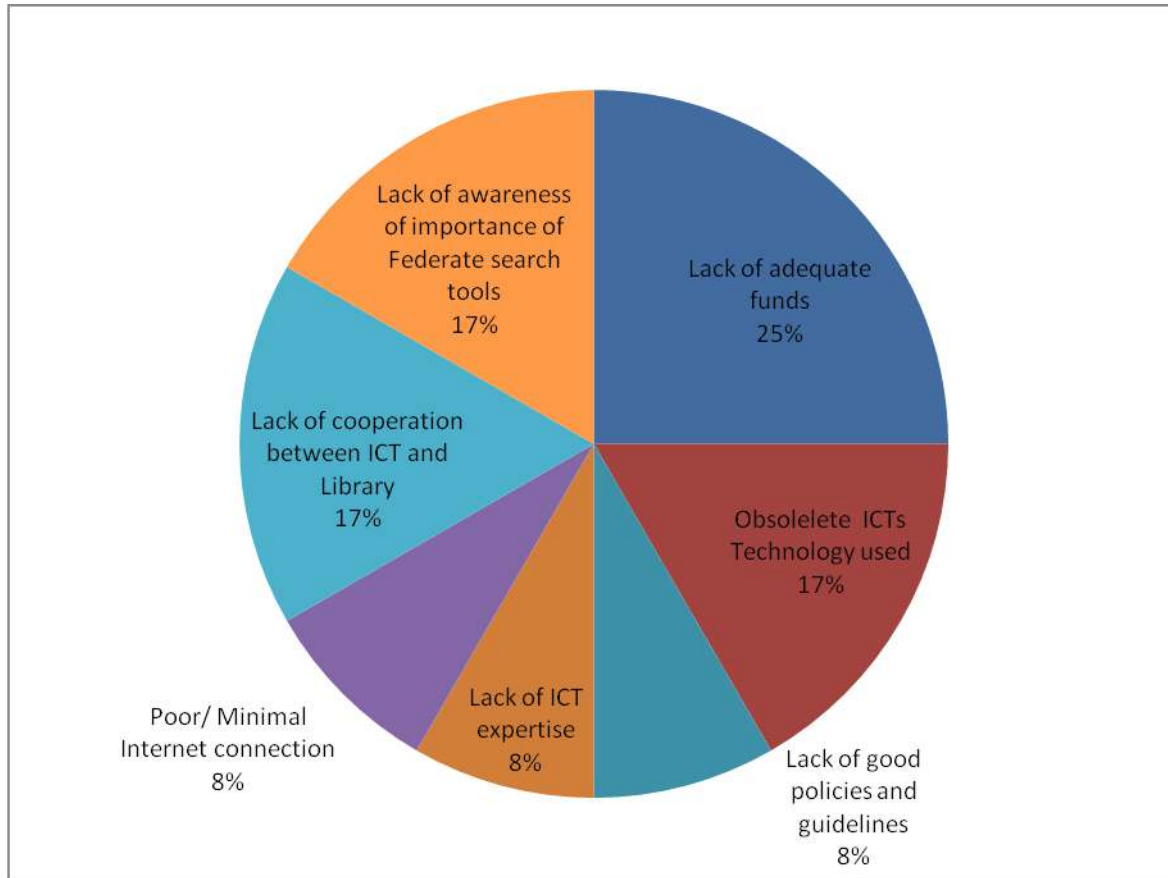
From Kabarak University, 33% (Figure 4.15) of the respondents believed ICT staff does not have the required competencies in installation of federated search tools, 33% (Figure 4.16) did not believe that they have adequate skills in customization, 33% (Figure 4.17) believed that they did not have skills to conduct training users, and 50% (Figure 4.18) believed that they did not have skills in trouble shooting.

While majority of the respondents at Kabarak University felt that are able to deal with all the steps in implementation, there were those who felt that the library face challenges in all the areas.

It is instructive to note that in his study, Mutula (2010) identified inadequate computing skills as one of the biggest challenges encountered by academic libraries in their efforts to fully harness opportunities afforded by information technology. Ndegwa (2009) further shows efforts that have been made by libraries to enhance ICT skills among libraries from academic institutions.

#### 4.9 Ratings of Factors Affecting Implementation of Federated Search Tools

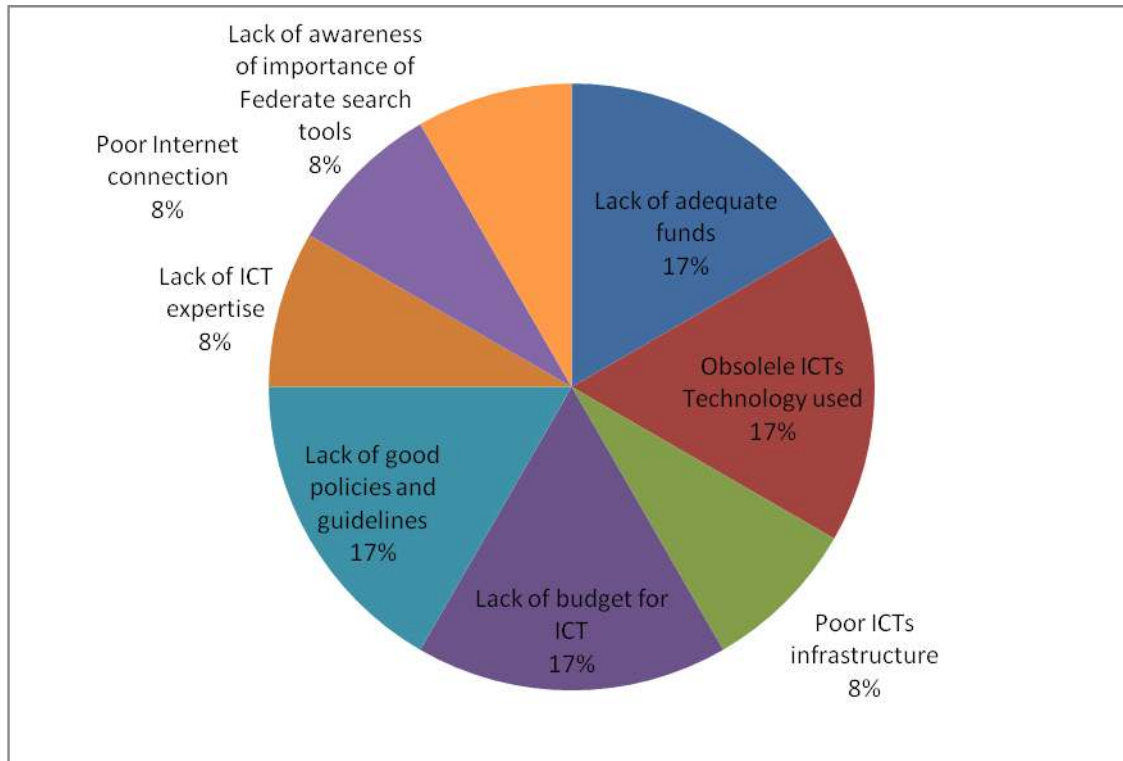
Respondents were asked to rate the extent to which each of the listed components constraints implementation of federated search tools. This was to determine what extend each of the listed factors contribute to the challenges in implement of federated search tools. Responses from the two universities were as indicated in Figures 4.19 and 4.20 below:



**Figure 4.19: Ratings of Factors Affecting Implementation of Federated Search Tools- St.**

**Paul's university**

From the above chart, it is seen that lack of adequate budget affects to a great extent the implementation of federated search tools while ICT infrastructure, policies ICT skills and internet connectivity are considered as the least contributing factors.



**Figure 4.20: Ratings of Factors Affecting Implementation of Federated Search Tools-  
Kabarak University**

In the case of Kabarak University, lack of funds, obsolete ICT technologies, policies contribute to large extent with each contributing by 17% while ICT expertise, poor internet, ICT infrastructure and lack of awareness contribute the least.

## **CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

### **5.0 Introduction**

This chapter covered the summaries of the main findings based on the objectives of the study. It gives recommendations which deal with on key issues that were found to contribute to challenges faced by the selected academic libraries in the efforts to implement federated search tools.

### **5.1 Summary of the Findings**

The overall aim of the study was to investigate challenges faced by academic librarian in effort to implement federated search tools.

The findings show that two university libraries were at different stages of implementation of federated search tools. Kabarak University library were at the customization stage while St. Paul's University were at the installation stage. From these findings, it follows that none of the two libraries have successfully implemented the federated search tools to the final stage. For successful implementation of federated search tools, the stages involves and includes, planning, selection, installation, customization, training, maintenance and trouble shooting.

The findings rated the support from library management to be good at both libraries. Management support was rated at 86% from respondents at St. Paul's while at Kabarak, 67%. Though support from management falls short of the maximum support that is very good or excellent, that is needed for implementation of federated search tools to be successful.

The findings show that library management supports the implementation of federate search tool only through creating awareness to the top University management. They however did not source for funds or an allocation for fund which would be required in order to implement the tools successfully.

The study established that ICT infrastructure contributed to challenges encountered in implementation of federated search tools. Most respondents indicated that ICT infrastructure were good but felt short of rating them as excellent which is interpreted to mean that though Universities provide infrastructure such as servers other components such as Local area Network and internet connectivity which form the critical foundation for implementation of federated search tools are inadequate. From the findings, therefore lack of adequate infrastructure is therefore hampering the successful implementation.

In terms of ICT skills and competencies the study established that ICT staff lacked the critical ICT skills competence that is required for successful implementation. In the case of St. Paul's University only 33% of respondents believed, ICT personnel have adequate ICT skills in installation 25% in customization, 25% in training and 12% in trouble shooting.

The study also established that St. Paul's University has an ICT person tasked specifically with implementation of IT projects in the Library. However in the case of Kabarak they do not have an ICT person specifically tasked with overseeing IT Library project.

The study also indicates that users have not been trained on the use of federated search tools. This shows that level of preparedness to successful implementation and use of the tools to be low. It also shows that the libraries are not fully prepared for takeoff of federated search tools.

In the case of policies, the study found out that both Kabarak and St. Paul's University did not have policies in place that would guide the implementation of federated search tools.

As far as budgetary provision is concerned, the findings of the study showed that none of the universities had made budget allocation set aside for the implementation of federated search tools. Lack of budgetary provision made it very difficult for libraries to fully implement federated search tools to its final completion as some of the stages to be implemented required resources.

### **5.3 Conclusions**

The study set to establish factors that hindered the selected academic libraries in their efforts to successfully implement federated search tools. The specific objectives was to establish the stage at the selected libraries were in the implementation of federated search tools, the kind of support libraries received from university management, determine whether libraries received adequate budgetary allocation to facilitate implementation, whether libraries had policies that guided in the implementation process, establish whether they had adequate ICT infrastructure and whether the librarians had adequate ICT skills and training to manage implementation of federated search tools. Based on the findings derived, this study concludes the following:

#### **5.3.1 Implementation Stage**

The two libraries have not fully implemented the federated search tools. The two libraries were at different stages of implementation. St. Paul's University was at the installation stage while Kabarak University was at customization stage. This therefore means until they overcome the

various challenges involved in implementation of federated search tools, it will be difficult for them to move forward.

### **5.3.2 Budgetary Allocation**

None of the libraries studied had funds allocated to facilitate implementation of federated search tools. It is important to note that funds are needed to finance development of ICT infrastructure, installation, and training. It therefore follows that implementation of federated search tools is handicapped as a result of failure to provide funding.

### **5.3.3 Management Support**

Though findings indicate that the library management fully supports the implementation of federated search tools, the support offered is limited to creating a awareness of the existence of federated search tools. It should be instructive that for the tools to be successfully implemented there is much that is needed from the library management. These include campaigning for activities such as budgetary allocation, provision of good ICT infrastructure.

The findings also indicate that both libraries do not have a committee or team that oversee or guide the implementation of federated search tools. This is a contributing factor to challenges of implementation. It therefore follows that ICT staff/System Librarians are left on their own to implement the tools. An ICT committee or team if it were in place would have been charged with the task of overseeing monitoring the progress of the implementation of federated search tools and also act as a bridge between the library and university management.



### **5.3.4 ICT Infrastructure**

Findings from both Universities indicated that among various ICT infrastructures, internet connectivity and Local Area Network are not satisfactory. It is instructive that good speed of internet connectivity is need not only during installation but also after the implementation of the tools. For users to effectively access e-resources, using federated search tools will require good internet speed especially taking into consideration that users will be searching multiple database at a single stance. Reliable Local Area Network is also required in order to facilitate access.

### **5.3.5 ICT Skills**

Though the findings rates the skills of librarian in charge of ICT as good, these are however not adequate to meet the threshold needed in terms of competence required to successfully installation, custom, train and troubles shoot federated search tools. To carry out implementation of federated search tools, the ICT skills of the person undertaking implementation should be conversant with every aspect and should therefore be very good.

### **5.3.6 Policies**

St. Paul's and Kabarak Universities do not have policies that guide in the implementation of federated search tools. This is a major loophole as the libraries do not have guidelines that could be used to guide the entire implementation process of federated search tools from selection of software to be used to installing and training.

### **5.3.7 ICT Support**

The findings also indicated that the two libraries do not receive adequate support from University ICT department in the implementation of federated search tools. This support would ideally serve to strengthen and compliment the skills of the librarian in charge of ICT in the implementation.

## **5.4 Recommendations**

Implementation of federated search tools cannot be carried out successful unless appropriate measures are put in place so as to address the critical areas that are hindering the full implementation. To achieve the desired outcome, successful implementation of federated search tools, there is need for the two university libraries to address critical areas that are involved in the implementation of the tools. The research therefore recommends critical areas that need to be addressed based on the findings of the study.

### **5.5.1 Stage in Implementation**

The study established that St. Paul's University was at installation stage while Kabarak University was at customization stage. For St. Paul's University to successfully implement federated search tools, they need to ensure that the implementation goes through the remaining stages, that is, installation, customization, training and trouble shooting. Kabarak University on the other hand needs to ensure that implementation goes through training and troubleshooting.

### **5.5.2 Management Support**

The study established that though both libraries receive support to some extent from the University management, the support fall short of full support required. Based on this finding, it is critical that management provide total management support is available for successful

implementation of federated search tools. Management should play critical role in campaigning for provision of funds needed for implementation of federated search tools. It would be helpful if library management identify what is critically needed for successful implementation of federated search tools and concentrate its efforts towards it. Management need to play a critical role in ensuring that university puts together resources required for successful implementation of federated search tools.

Libraries should put in place oversight committee or team that would oversee the implementation. The committee would ensure that libraries get full support and would also monitor and report the progress being made. For such a committee to be effective membership should include all the major stakeholders in the university. It is important to have representation from University administration, ICT, faculty and the library itself. The committee should have clear mandate and reporting structure so as to be effective.

The library administration should also be actively involved in looking for funds from external sources. For instance IFLE.net and INASP regularly funds proposals which enhances the use of electronic resource in developing countries and often invites libraries to submit proposals for consideration for funding.

### **5.5.3 Budgetary Allocation**

The study established that both libraries do not receive budgetary allocation specifically for implementation of federated search tools. Based on that, it is recommended that there is need for funds to be set aside to support the implementation of federated search tools. Without budgetary allocation it will be difficult to undertake important activities, for instance installation and customization where expertise is needed from external consultancy or vendor. Budgetary allocation is also critical in financing the necessary ICT infrastructure such as sever computers

that are required in the implementation process.

#### **5.5.4 ICT Infrastructure**

Study established that as far as ICT infrastructure was concerned, internet connectivity and Local Area Network (LAN) presented a challenge at both libraries. Based on that, it is recommended that the Universities should ensure that libraries have reliable internet connectivity as is required both at installation stage and is also required once the tools are successful implemented as it will facilitate access of the tools by library users. The universities should also improve the LAN to ensure that there is reliable internet connectivity.

#### **5.5.5 ICT Skills**

The findings indicated that staff from both Kabarak and St. Paul's Universities did not have adequate ICT competencies to carry out the successful implementation of federated search tools. Based on this, there is need to equip the ICT staff to acquire the needed skills for installation, customization, training and troubleshooting the tools. It should be important for library to identify the skills and organize for them to acquire training. This could be achieved if ICT staffs attend specialized areas that are critical in implementation of federated search tools.

Through such trainings ICT staff are better equipped not only to carryout implementation but also acquire the necessary skills to enable them train both library staff and library users once the FST is successfully implemented.

### **5.5.6 Policies**

The study established that both libraries do not have policies that are required to guide the implementation process. Based on the findings of the study, it is important for the two libraries to come up with policies that will address the issue concerned with implementation of federated search tools. The policy should be able to capture all the areas involved in implementation and use of federated search tools. The policy should therefore be able to offer guidelines on the installation, customization, maintaining and training of federated search tools. The policy is necessary as it will be used by library management to justify the need for funding, adequate ICT infrastructure, and staffing needs as well as give guidance in the use of federated search tools.

### **5.5.7 University ICT Department Support**

The study established that library do not receive adequate support from the University ICT department which is critical for successful implementation of federated search tools. Based on this, the study recommends that there should be a good working between library and the university ICT department. For successful implementation of federated search tools, University ICT department is required to play a key role. Federated search tools depends on provision of necessary ICT infrastructure which include servers, Local Area Network, internet connections and even ICT expertise in some areas. Good working relations between the two departments is critical to the successful implementation and should therefore be nurtured and maintained.

### **5.6 Recommendations for Further Studies**

This study focused on the implementation of federated search tools an academic setup. The researcher suggests that there is need for further study on the effectiveness of training acquired

by Systems Librarian in Kenya Universities. This came about on the realization that despite the fact that though the two libraries which were under study had Systems Librarians, they were unable to successfully carryout implementation of federated search tools. This raised the concern as to whether the kind of training they receive prepares them adequately to implement information systems that are required by libraries.

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**APPENDIX A: QUESTIONNAIRES FOR LIBRARY STAFF****SECTION A: BACKGROUND INFORMATION (tick as applicable)**

1. What is your designation?

University Librarian [ ]

Deputy University Librarian [ ]

Reader Service Librarian [ ]

Digital/ System/ICTs Librarian [ ]

Reference Service Librarian [ ]

Others (Specify) \_\_\_\_\_

2. What is your professional qualification in the field of librarianship?

Diploma in library studies [ ]

Higher National Diploma [ ]

1<sup>st</sup> Degree [ ]

Masters [ ]

PHD [ ]

Any other \_\_\_\_\_

**SECTION B: STAGE IN IMPLEMENTATION OF FEDERATED SEARCH TOOLS**

3. What stage is your library in implementation of Federated search tools?

Planning [ ]

Selection of software [ ]

Installation [ ]

Customization [ ]  
 Testing [ ]  
 Training [ ]  
 Completed [ ]

Others \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**SECTION C: FUNDING IMPLEMENTATION OF FEDERATED SEARCH TOOLS**

4. Is there budgetary allocation for implementation of federated search tools?

Yes [ ]

No [ ]

If No to the above how is/was implementation funded?

By Donor(s) [ ]

No funding was required [ ]

Any other (Specify)

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5. Did your library ask for help from other sources when implementing federated search tools?

Yes, from other libraries in Kenya [ ]

Yes, from donor institutions [ ]

Information Technology vendors/consultancy firms [ ]

If yes, which specific sources did you ask for help

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If you asked for help in the above what kind of help did you ask for?

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6. If funding is provided by your Institution, which areas are covered in relations to implementation of FST?

Installation [ ]

ICT infrastructure [ ]

Training [ ]

Others (specify)

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7. Which areas are affected by inadequate funding (Tick as appropriate)?

Installation [ ]

ICT infrastructure [ ]

Training [ ]

Others (specify)

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**SECTION D: LIBRARY MANAGEMENT SUPPORT**

8. Does the library receive any kind of support from the library management in implementation of federated search tools?

Yes [ ]

No [ ]

If yes, what kind of support

Creating awareness to University management [ ]

Sourcing for funds for implementation [ ]

Allocating funds to implementation [ ]

Other kind of support

9. Is there a committee/team to give advice, guidance or oversee the implementation of federated search tools?

Yes [ ]

No [ ]

10. Rate the library management's understanding on the importance of federated search tools to library users

Very Poor [ ]

Poor [ ]

Good [ ]

Very good [ ]

Excellent [ ]

**SECTION E: ICT INFRASTRUCTURE**

11. Rate the following basing on your ICTs infrastructure facilities in the library?

	Very Poor	Poor	Good	Very good	Excellent
	1	2	3	4	5
Server(s)					
Training facilities (e.g. e-resource centres, research labs)					
ICTs Literacy skills					
Local Area Network (LAN)					
Internet Connectivity					
Obsolescent of ICTs Technology used					

Others: .....

.....

**SECTION F: ICT SKILLS AND TRAINING**

12. Does your library staff have competencies in the following?

- Installation [ ]
- Customization [ ]
- Training [ ]
- Trouble shooting installation [ ]



Others

(specify)

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13. How do you rate the ICT skills of library staff in charge IT services?

Very good [ ]

Good [ ]

Poor [ ]

Very poor [ ]

Other \_\_\_\_\_

14. Have librarians received training on the use of federated search tools?

Yes [ ]

No [ ]

If yes which areas did the training emphasize on?

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15. Have library users been train on the use of federated search tools?

Yes [ ]

No [ ]

If yes which areas did the training emphasize on?

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**SECTION G: POLICIES**

**16.** Does your library have policies to guide in implementation of federated search tools?

Yes [ ]

No [ ]

Explain

---

---

**17.** If your library has a policy which areas are addressed in the policy?

Implementation [ ]

Use of federated search tools [ ]

Training [ ]

Maintenance and support [ ]

Other(specify)

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---

**18.** Do you have any other information that might of importance to this research?

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Selection and acquisition of hardware [ ]  
 Installation [ ]  
 Trouble shooting installation [ ]  
 Customization [ ]  
 None [ ]  
 Others kind of support (specify)

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**5. How do you rate the following ICTs infrastructure facilities in the library?**

	Very Poor	Poor	Good	Very good	Excellent
	1	2	3	4	5
Adequacy of Computers (server, e-resource centres, research labs)					
ICTs Literacy skills					
Internet Connectivity					
Computer Specifications					
Policies to enhance adoption and use of ICTs					
Budget allocation for ICTs					



**SECTION D: CONSTRAINTS ASSOCIATED WITH IMPLEMENTATION OF FEDERATED SEARCH TOOLS AND THE WAY FORWARD**

6. To what extent do the following constraints influence implementation of federated search tool? **Where 1 = Greatest constraint and 5 = least constraint**

<b>Factor</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Lack of adequate funds					
Obsolesce of ICTs Technology used					
Poor ICTs infrastructure					
Lack of budget for ICT					
Lack of good policies and guidelines					
Lack of ICT expertise					
Poor leadership in Libraries					
Lack of support from library administration					
Lack of commitment by library and institutional management					
Poor/ Minimal Internet connection					
Lack of cooperation between ICT and Library					
Lack of awareness of importance of Federate search tools					

Other: .....

.....

.....

7. What do you think is the most important thing to do in order to successfully implement federated search tools in the library academic libraries? Where 1 = **Very important** and 5 = **Least Important**

<b>Factor</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Develop good Policies					
Adopt and use up to date technologies					
Improve Budget allocation for ICTS					
Increase internet Connectivity					
Staff Training					
Improved management and Leaderships in our libraries					
Employ qualified systems Librarians					
Create awareness of importance of federated search tools					

**8.** In your own opinion, how can the constraints associated implementation of federated search tools are minimized?

.....  
 .....  
 .....  
 .....  
 .....

**9.** Do you have any other information that might of importance to this research?

.....  
 .....  
 .....

**APPENDIX C: INTERVIEW SCHEDULE**

1. Have you library started implementation of federated search tools?
  - A). If yes, how what stage are you in the implementation process?
  - b) If no, what has hindered you from implementing it:
  
2. Does your library provide budgetary allocation for implementation of federated search tools?
  - a) Kindly explain?
  
3. If funding is provided by your Institution, which areas are covered in relations to implementation of FST?
  
4. What kind of support do you receive from the University management?
  
5. What is the situation in terms of ICTs infrastructure facilities in the library?
  - A). What ICT infrastructure are lacking?
  
6. What training activities have you put in place to ensure there implementations of federated search tools are a success?
  - a). Are these training effective in equipping library staff with the necessary skills for implementation of federated search tools? Please explain
  
7. Does your library have policies to guide in implementation of federated search tools?  
Kindly explain



8. What are your comments about challenges to implementation of federated search tools?

**APPENDIX D: LETTER OF REQUEST FOR RESEARCH**



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28<sup>th</sup> March 2013

TO WHOM IT MAY CONCERN

RE: KENNETH K. ROTICH - E65/OL/12189/2009

This is to introduce the above named student who is a Postgraduate student in our department. He is carrying out his research on a topic entitled "Challenges encountered by academic libraries in implementation of federated search tools: A study selected Universities in Kenya".

Any assistance given to him will be highly appreciated.

Thank you.



DR. DANIEL W. MUTHEE  
CHAIRMAN  
DEPARTMENT OF LIBRARY & INFORMATION SCIENCE

DWM/enm

