DEVELOPING A FRAMEWORK FOR INFORMATION RESOURCE SHARING IN INFORMATION CENTRES IN ELECTRIC POWER SUB-SECTOR IN KENYA

BY

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DECLARATION

DECLARATION BY THE CANDIDATES

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DEDICATION

To the Almighty God who has given me the ability and the knowledge to make an impact in the field of Information Science. To my husband, Dr David Odongo, who has supported my efforts through the challenging times of my study. To my parents, Mr and Mrs Okindawho motivated me and supported my venture in advancing my education.

ABSTRACT

The Electricity Supply Sub-sector is part of the energy sector in Kenya, with the mandate to generate and supply electric energy throughout the country. It has been undergoing restructuring and reforms since the mid-90s, which has affected the operations of its information centres. Consequently, a probable lack of a formal information resource sharing program is likely to have contributed to poor information services in the sub-sector's operations, resulting in low quality work when it comes to customer service. The aim of this study was to investigate information resource sharing activities in ESI, to identify shortcomings and to suggest strategies for their improvement that leads to development of an information resource sharing framework. Specifically, it examined information resources and services available, their access and use; it determined the forms and adequacy of information resource sharing activities; the extent of ICT use in information resource sharing; the challenges ESI experiences in information resource sharing; and finally, recommended strategies for improvement that led to developing a framework for information resource sharing activities in ESI. The study was informed by Intra-type Resource Sharing Model and the Secure Layered Model for Digital Libraries Interaction. Both qualitative and quantitative approaches were used. Using the qualitative approach, the study employed exploratory method and applied purposive sampling. Nine senior staff of information centres in ESI were sampled and face-to-face interviews used to collect data from them. Under the quantitative approach, survey method was employed and it applied simple random sampling. A sample of 250 (95% confidence level and ±6 margin of error) out of 3320 target population was selected and the data collection instrument used was the questionnaire. Both thematic and descriptive statistics results were used for data analysis. The study revealed that there is availability of varied information resources and services, that access to and use of information resources is not as extensive as it should be, that there was a lack of a formal program on information resource sharing and inadequacy of informal information resource sharing activities. The study revealed that the useof ICT in information resource sharing activities is limited. It also identified challenges like inadequate resources, users' unawareness of services available and limited networking among information centres. In conclusion, the lack of a formal information resource sharing program in ESI negatively affects information services. The recommended strategies for improvement were: establishing more information centres, automation and digitization of existing centres, enhancing policies on information resource sharing and the use of the developed framework for information resource sharing. A framework in information resource sharing which provides the structure and guidelines in establishing information resource sharing program in ESI has thus been developed and proposed for adoption in ESI. This is expected to impact positively on information services, thus improving the quality of services and products in ESI.

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LIST OF ABBREVIATIONS AND ACRONYMS

CBD	Central Business District
CBIES/RJ	The Academic Resource Sharing Consortia of Rio de Janeiro
CIB	Collaborative Information Behaviour
CSCW	Computer-Supported Cooperative Work
DL	Digital Library
ERC	Energy Regulatory Commission
ESI	The Kenya Electricity Supply Industry
GDC	Geothermal Development Company
GoK	The Government of Kenya
ICT	Information and Communications Technology
ILL	Inter-library loans
IPPs	Independent Power Producers
IR	Information Retrieval
KEBS	Kenya Bureau of Standards
KenGen	Kenya Generating Company
KETRACO	The Kenya Transmission Company
KIPPRA	Kenya Institute for Public Policy, Research and Analysis
KNADS	Kenya National Archives and Documentation
KPLC	The Kenya Power & Lighting Company Ltd
MARC	Machine Readable Catalogue
MoE	Ministry of Energy
MUSE	Multi-User Search Engine
MW	Mega Watts
OCLC	Online Computer Library Centre
PPAs	Power Purchasing Agreements
REA	The Rural Electrification Authority
REP	Rural Electrification Programme
TARDA	Tana and Athi River Development Authority

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I thank my workmates who were a source of encouragement, especially when I faced difficult hurdles during the data collection exercise. I will remain thankful to my superiors and colleagues whose service and dedication will continue to provide electric power and lighting for the growth of our nation even as I hope that the results of this study will contribute to our great vision.

Above all, I thank God for giving me the ability, the intellectual capacity and strength to accomplish this study.

CHAPTER ONE

INTRODUCTION AND BACKGROUND INFORMATION

1.1 Introduction

In a technology driven economy that Kenya has become, distribution and management of power supply is essential. Electricity Supply Industry Sub-sector (ESI) is one of the three sub-sectors in the energy sector with the mandate to supply electric energy throughout the country. It is a large sector that has diversified activities and covers a wide topographical area when it comes to the distribution of electricity. In today's information age, information resource sharing contributes significantly to the country's economy. This study focused on information resource sharing among the information centres in ESI. The use of information resource sharing in ESI is linked to the quality of existing information services, efficiency and effectiveness of information management, enhanced communication across the players in ESI sub-sector and quality of data and information access. This chapter gives background information to the study, a statement of the problem, the aim of the study, the objectives, research questions, the significance of the study and the scope and limitations of the study.

1.2 Background Information to the Study

Power generation, distribution and management are dependent on different operators that have distinct roles. As a background to this study, it is important to describe these diverse roles in an industry that is highly dependent on information sharing.

1.2.1 Electricity Supply Industry Sub-Sector (ESI)

The Electricity Supply Industry (ESI) is one of the three sub-sectors in the energy sector which the Ministry of Energy (MoE) exercises oversight on behalf of the

Government of Kenya (GoK) as illustrated in the ESI structure in Appendix 8.The energy sector has been undergoing restructuring and reforms since the mid-90s, which culminated in the enactment of the Energy Act, No 12 of 2006 (The Energy Act, 2006). Before 1998, Kenya Power and Lighting Co. Ltd (KPLC)was charged with generation, transmission and distribution of electricity in Kenya under the Electric Power Act, 1982.According to The National Energy Policy (2012), The Electric Power Act of 1997 brought about the separation of generation from transmission and distribution functions.This Act and the Sessional Paper No. 4 of 2004 on Energy widely liberalized the energy sector in the country which was started in 1997 when KenGen was formed out of KPLC. The Policy Paper and other significant government publications established a single energy regulator and unbundled KPLC to form Kenya Transmission Company (KETRACO), Rural Electrification Authority (REA) and Geothermal Development Authority (GDC).Under the Energy Act No. 12 (2006), MoE is responsible for formulation and articulation of policies through which it provides an enabling environment to all participants in the energy sector.

1.2.2 Kenya Power & Lighting Co. Ltd. (KPLC)

Kenya Power (2015) states the company's mission as powering people for better lives. From the KPLC website, it is described as being the transmission, distribution and retail supply of electric energy to end users. It ensures that there is adequate line capacity to maintain supply and quality of electricity across the country. The interconnected network of transmission and distribution lines covers about 41,486 kilometers. KPLC purchases power in bulk from KenGen and the IPPs through bilateral contracts or PPAs approved by ERC.

1.2.3. Kenya Generating Company Ltd. (KenGen)

KenGen came about as a result of splitting energy generation functions from transmission and distribution in KPLC in 1997. At that point, the Kenya Power Company which had been under the management of KPLC since 1954, became a separate entity from KPLC. It was charged with managing all public power generation facilities in the country.KenGen accounts for close to 80% of generation, while 20% is generated by six (6) Independent Power Producers (IPPs), namely Aggreko, Iberafrica Power (EA) Ltd, Tsavo Power Company Ltd, OrPower4 Inc., Mumias Sugar Company Ltd. and Rabai Power Ltd. KenGen, 2012). The company utilizes various sources to generate electricity ranging from hydro, geothermal, thermal and wind. Hydro is the leading source with an installed capacity of 766.88mW, which is 64.9 per cent of the company's installed capacity. KenGen has 14 hydro power plants throughout the country, some of which include Wanji Power Station, Turkwel Power Station, Kamburu Power Station, Tana Power Station, *etcetera*.

1.2.4 Rural Electrification Authority (REA)

Faced with the urgent need for acceleration of rural electrification in the country, REA was formed. This player was established under Section 66 of the Energy Act 2006 to, among others, develop and update the rural electrification master plan, implement the rural electrification programme and promote the use of renewable energy sources.

1.2.5 Geothermal Development Company (GDC)

GDC was formed in 2009 for the purpose of exploiting the huge but largely untapped geothermal energy potential. The creation of GDC was based on the government's policy on energy, Sessional paper No. 4 of 2004 on Energy, and the Energy Act

No.12 of 2006, which un-bundled the key players in the electricity sector to ensure efficiency. The government has identified the country's untapped geothermal potential as the most suitable indigenous source of electricity. GDC's activities include exploration, drilling, assessing and development of geothermal steam for power generation and alternative uses. GDC's goal is to drill 1400 steam wells to provide steam for the generation of 5,000MW of geothermal power by 2030.

1.2.6 Kenya Transmission Company (KETRACO)

KETRACO was formed in 2009 under the Company's Act, CAP 486, to develop new transmission lines. KETRACO is responsible for the project planning and management of power transmission under KPLC. It was incorporated by the government to accelerate transmission infrastructure development. Its mandate is to design, construct, operate and maintain new high voltage electricity transmission lines which would form the backbone of the National Transmission Grid and regional interconnections.

1.2.7 Tana and Athi Rivers Development Authority (TARDA)

TARDA, which owns the dams on Tana River for generating hydro power, was established by an act of parliament, CAP 443, in 1974with the primary role of acting as the strategic driver of regional economic development in the region. It is responsible to the Government through the Ministry of Regional Development Authorities for planning, coordination and implementation of projects within the Tana and Athi river basins. One of its mandates is to assess alternative demands of the resources within the area, which include electricity power generation, irrigation, wildlife, other uses of land, and to recommend economic priorities.

1.2.8 Energy Regulatory Commission (ERC)

ERC is established under the Energy Act, 2006. It is a single sector regulatory agency with responsibilities for economic and technical regulation of electric power, renewable energy, and downstream petroleum sub-sectors, including tariff setting and review, licensing, enforcement, dispute settlement and approval of power purchase and network service contracts. It also monitors, ensures implementation of, and sees to it that the principles of fair competition are observed in the energy sector in coordination with other statutory authorities.

1.3 Information resource sharing and ESI Players

In the field of libraries, Mishra (2000) states that the history of information resource sharing might be traced to their inception in various forms, for instance, shared cataloguing, library cooperation, interlibrary loan and the union catalogue. The term "library resources" includes any and all of the materials, functions and services, which constitute a modern library system. All players in ESI have made the effort to have functions set up to serve the information needs of their respective users. Okeagu and Okeagu (2008) indicate that libraries have realized that no matter how well-funded they are, it is difficult for them to acquire all the materials needed by their clientele. Partnership and cooperation is inevitable for information centres in ESI sub-sector. One way of achieving this cooperation is through the establishment of consortiums, a syndication arrangement which enables libraries to work together more efficiently.

Presently, the information centres of ESI work independently of each other. These institutions strive on their own with the aim of meeting the demands for varied information services for their clients. The membership of each information centre is restricted to those working in its parent organization. The information centre in KPLC

was established as the first initiative to serve East Africa Power & Lighting Company's information needs. This was followed by the information centres in TARDA, KenGen, REA, KETRACO and GDC, all after their inception.

According to Ministry of Energy (2012), there is need to form an inter-agency committee that will ensure close collaboration with institutions like KEBS and KIPPRA that collect, analyze and prepare policy papers to facilitate accessing specific information relating to the energy sector. There is also a need to enhance research linkages between industries and the academia. Information Services and Systems in ESI are best placed to accomplish these objectives if they are to strengthen information resource sharing initiatives. All information centres in ESI have their independent policies that guide in the acquisition, processing, organization, dissemination, preservation and disposal of materials. While some of the players in ESI control the way other players within the sector operate, the operations of many players are interrelated.

1.3.1Information Resource Sharing in ERC

ERC is mandated by the government to formulate licensing procedures, issue licenses and permits, and make recommendations for the necessary regulations to be issued by the minister. It also serves the role of formulating, enforcing reviewing environmental, health, safety and quality codes and standards; setting, reviewing and adjusting electric power tariffs; approving power purchase and network service contracts; examining and approving meters; investigating complaints between parties; accrediting energy auditors; ensuring competition; collecting and maintaining energy data; protecting stakeholders interests, and preparing an indicative national energy plan (ERC, 2012). All information centres in ESI are occasionally required to access

this vital information on behalf of their users. There is no known formal information resource sharing activity between ERC and players in ESI, hence information exchange and sharing is achieved through collaborative meetings and tasks. However, there in need to establish the level of the effectiveness of the information resource sharing program and how policies and guidelines have impacted on the same.

1.3.2InformationResource Sharing in KPLC

KPLC libraries have informal interlibrary activities with KenGen Information Centre. Formal resource sharing policies and programs do not exist between KPLC and the rest of the players in ESI sub-sector. Despite the lack of existence of a formal information resource sharing activity, however, KPLC requires information exchange with KenGen, GDC, KETRACO, TARDA, REA and ERC. This is because it has an interest in the outputs of KenGen and KETRACO, since KenGen deals with generation of power which is sold to KPLC and then distributed to its customers.

1.3.3InformationResource Status in KETRACO

The Departmental Committee on Energy (2010) states that while KETRACO's mandate includes planning, designing, constructing, operating and maintaining high voltage electricity transmission lines and sub-stations, KPLC retains ownership of its existing transmission lines. KPLC information centre has information on KPLC-owned existing transmission lines, which is supposed to be accessed by staff involved in KETRACO's transmission projects. KPLC, on the other hand, needs to access information on transmission projects undertaken by KETRACO, yet KETRACO does not have any formal information resource sharing activity with other players of ESI sub-sector. In most cases the players in ESI sub-sector are not aware that information

required can be obtained from their counterparts or, worse still, the magnitude of the duplication of information sources within the sub-sector.

1.3.4 Information Resource Status in REA

In the same case, REA does not provide formal information services to their users, hence the lack of formal resource sharing with other players. Information organization and dissemination is handled by the Corporate Strategy and Human Resource Departments, which in this study are referred to as "information centres". The information centres of both KPLC and REA share information on REA related projects that each company has undertaken. The usual scenario is that information Exchange Is Done by Individuals from Different Players. This Means That When An Individual Requires Information From A Different Player, They Must Have Prior Knowledge Of The Party That Would Most Likely Have That Information Resource.

1.3.5 Information Resource Sharing in KenGen

KenGen has already established internal systems and procedures for information resource sharing. They have an intranet that has active discussion forums and exchange of publications. The same platform provides employees with the opportunity to share and develop content. KenGen has temporarily established a formal resource sharing program with TARDA.TARDA owns the dams on Tana River which KenGen uses to generate hydro power. This implies that all the information regarding the dams' infrastructure can only be obtained from TARDA. Before making any adjustments or reinforcements on the dams, KenGen personnel must make reference to these publications and drawings which are housed by TARDA information centre. However, KenGen is likely not to have formalized its information

resource sharing activities with the other players in ESI sub-sector. Informal inter-library loaning activities exist with KPLC and GDC information centres.

1.3.6 Information Resource Status in GDC

A good working relation exists between KenGen and GDC. KenGen prior to the formation of GDC, was involved in geothermal exploration. Information resource sharing exists between the two players on an informal basis.The Departmental Committee on Energy (2010) states that KenGen at present operates two (2) geothermal power plants: Olkaria I, which was commissioned in 1981 and produces 45MW from 33 wells; and Olkaria II, which produces 70 MW.GDC has identified fourteen (14) potential geothermal sites in the country and is currently in the process of drilling forty (40) geothermal wells to provide steam to KenGen for a 280MW geothermal power plant.GDC should gain access to KenGen information centre to access relevant information before carrying out its geothermal explorations, and vice versa. Information resource sharing between the two players has not been formalized, despite the fact that information exchange is practised informally between individuals or departments when the need arises.

1.4 Statement of the Problem

The objectives of the information centers of ESI lean towards acquisition, organization, dissemination and preservation of information that drives each of the firms to achieve their overall goals interspersed into generation, transmission and distribution of electrical energy. The individual goals of information centres in ESI are focused towards a general common goal, which is the availability of cost-effective quality energy. These centres not only enjoy strong working relationship with each other but also require exchange of information. For instance, The Departmental

Committee on Energy (2010) stated that since its establishment, REA has implemented several REP schemes directly through private contractors, while KPLC has implemented some other schemes on behalf of the government, mainly those that were in progress at the time of the formation of REA. Irrespective of the organization that has implemented the projects, all have eventually been handed over to KPLC upon completion, for operation and maintenance, but the ownership of the assets has remained with REA.

By the time this study was undertaken, there was no evidence of formal arrangements or policies regarding information resource sharing among the players of ESI. Limitation to the access of relevant information by key players impacts negatively on their operations, upgrading of the infrastructure, research and innovation initiatives and the effort towards achieving Kenya Vision 2030. According to Kaul (2001), the voluminous growth of published documents in the recent past, increase of cost of information sources, technological advancements that offer newer methods of information processing, retrieval and dissemination are some of the factors that deem it necessary for resource sharing, even in ESI. The current status reveals that information centres in ESI lack coordination and cooperation to reduce strains, time and stages in the accessibility by each ESI player to shared information resources. Thus, the likelihood of a lack of a formal information resource sharing program in information centres in ESI is suspected to have denied the players of ESI relevant and timely information in their current operations. The purpose of this study was to identify ways to improve on information sharing so as to enhance the quality of working relationships and productivity for efficient and effective services to customers of electric energy.

1.5 Aim of the Study

The aim of this study was to investigate information resource sharing activities in ESI, identify strengths, challenges and suggest strategies for improvement to develop a framework for information resource sharing.

1.6 Objectives

The objectives of the study were to:

i. Examine information resources and services available in ESI.
ii. Establish the access and use of information resources and services in ESI.
iii. Determine the forms and adequacy of information resource sharing activities in the ESI sub-sector.
iv. Determine the extent of ICT use in resource sharing activities in ESI
v. Identify the challenges experienced by ESI players in information resource sharing activities.
vi. Suggest strategies for improvement so as to develop a framework for information resource sharing activities in ESI.

1.7 Research Questions

This study was guided by the following research questions:

i. What kind of information resources and services exist in the information centres in ESI?
ii. How are the information resources and services accessed and used in ESI?
iii. What forms of information resource sharing activities exist in ESI and how adequate are they?
iv. To what extent has the existing information resource sharing activity adopted the use of ICT in the information centres in ESI?

v. What challenges and limitations do ESI information centres face in information resource sharing activities?

vi. What strategies can be suggested in the improvement of information resource sharing to be used to develop a framework in information resource sharing in information centres in ESI?

1.8 Assumptions

The study was conducted with the assumptions that:

i. The lack of a formal information resource sharing program in information resource centres in ESI has negatively affected the information services provided.

ii. Information resource sharing in ESI impacts on the organizational performance of players in the entire sub-sector.

iii. It is possible that developing a framework for information resource sharing in the ESI information centres will positively impact on the organization and performance of ESI.

1.9 Significance of the Study

The recommendations of this research are expected to provide:

i. Significant additional body of knowledge in information resource sharing in the information centres of ESI, thus enhancing the quality of research and innovations necessary for any interventions.

ii. Solutions to challenges encountered in information resource sharing activities in the information centres of ESI, thus improving the efficiency and effectiveness of sharing the relevant information within the sector.

iii. Information of significance that will inform policy formulation and procedures in information resource sharing in ESI that will in turn positively affect the supply of quality and affordable electric energy to customers, a key element in the strategy to help realize Kenya's Vision 2030.

1.10 Scope and Limitation of the Study

1.10.1 Scope of Study

The study was concerned with information resource sharing activities in the information centres of KPLC, KenGen, GDC, REA, KETRACO, ERC which are players in ESI and TARDA.

1.10.2 Limitations of Study

The study was expected to obtain policy related information from departments also classed as information centres, like Libraries, Human Resources, Communications, Call Centre, Research & Development, among others, within the players in ESI. However, the information was obtained from information resource centres like libraries and Records Management Centres who were more familiar with the concept of information resource sharing. A number of the staff members were reluctant to fill the questionnaires distributed to them. They lacked any motivation to fill them, for the reason that they did not relate the exercise to their daily work targets. To address this challenge, the researcher spent time trying to encourage and convince the respondents the relevance and benefits of the research. It was challenging to set appointments with the relevant information management staff members because they were not easily available. Appointments kept on being rescheduled, delaying the research program. Two players of ESI did not avail themselves at all for the interview. They presumed

that having no information centre in their organization implied that there was no one qualified enough to participate in the interviews.

1.10.3 Chapter Summary

The chapter outlined the status of Information resource sharing in information centres in ESI by first providing background information of the study and then highlighting the current status of information resource sharing in each player of ESI. It defined the problem statement, the aim of the study and six objectives of the study which were stated alongside with the research questions that were used to guide the study. The chapter also stated the significance of the study, the scope and limitations of the study.

1.11 Definition of Terms

Cluster: A number of school communities grouped together for perceived benefit.

Distribution: Circuitry involving high-voltage switchgear, step-down transformers, voltage dividers and related equipment used to receive high-voltage electricity from a primary source and redistribute it at lower voltages.

Distribution of electricity: The transfer of electricity to consumers within an area of consumption.

Electric Power: The rate at which electric energy is transferred. Electric power is measured by capacity and is commonly expressed in megawatts (MW). A megawatt (MW) is one million watts.

Generation of electricity: A process whereby electrical energy is obtained from some other form of energy.

Geothermal: Earth-heat. This relates to the internal heat of the earth or thermal energy of earth's interior.

Geothermal drilling: A geothermal heat pump or ground source heat pump is a central heating and/or cooling system that pumps heat to or from the ground.

Geothermal explorations: A multi-disciplinary process used to explore the subsurface in search of viable active geothermal regions with the ultimate goal of building a geothermal power plant, where hot fluids drive turbines to create electricity.

Geothermal power: Power generated using steam produced by heat emanating from the molten core of the earth. Geothermal power is produced by pumping water into cracks in the Earth's crust and then conveying the

heated water or steam back to the surface so that its heat can be extracted through a heat exchanger, or its pressure can be used to drive turbines.

Geothermal power plant: A place at which power is generated.

Hydropower: The capture of the energy (by means of waterwheels or hydraulic turbines) of moving water (falling or flowing water) to generate electric power.

Information resource sharing: These are activities resulting from an agreement, formal or informal, by a group of libraries to share collections, data, facilities, personnel, etc. The group organized for resource sharing is usually called a consortium or network.

Kenya Vision 2030: It is the country's new development blueprint covering the period 2008 to 2030. It aims to transform Kenya into an industrial, "middle-income country, providing a high quality life to all her citizens by the year 2030".

Knowledge: Human faculty resulting from interpreted information. It is an understanding that germinates from combination of data, information, experience and individual interpretation.

MARC: A system that uses a set of special characters, numbers, and letters to identify bibliographic information recorded in a computer file.

Parastatal: A firm owned or controlled wholly or partly by the government.

Power Station: An installation whose purpose is to generate electricity and which includes civil engineering works, energy conversion equipment and all the ancillary equipment.

Qualitative Methods: A research design which the researcher uses to gain an understanding of underlying reasons, opinions and motivations. It provides insights into a problem or helps to develop ideas or hypotheses for potential quantitative research

Resource Sharing: It is a term used to describe organized attempt by libraries to share materials and services cooperatively so as to provide one another with resources that might otherwise not be available to an individual institution. It represents an attempt to expand the availability of specialized, expensive (or just plain not-owned) resources beyond the bounds of a single institution.

Transmission of electricity: The transfer in bulk of electricity from generating stations to areas of consumption.

Transmission lines: These are lines which are a part of an electric power transmission system, used to transfer electric energy in bulk.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter discusses the theoretical framework pertaining to the different models in the area of information resource sharing and then makes suitable choices on models that were applied in this study. It discusses the concept and origin of information resource sharing in libraries and information centres, and highlights the findings and recommendations of studies undertaken in information resource sharing.

2.2. Theoretical Framework

The researcher explored the theoretical framework in information resource sharing. A theoretical framework in this case is an attempt to show the existence of self-formulated theories and how they relate to the research objectives and their connection with variables and propositions. It guides the research in determining what information is to be researched on and measured in information resource sharing.

The study considered several models related to Wilson's Model of Information Behavior, a model of Information Sharing in Industrial Organizations, A Secure, Layered Model on the Interaction of Digital Libraries Interaction, a model of Collaborative Information Behavior, Web-based Information Services and Resource Sharing, and Intra-type Resource Sharing model. Eventually it settled on two models; A Secure, Layered Model on the Interaction of Digital Libraries Interaction and Intra-type Resource Sharing Model which then were used to guide the research.

2.2.1Wilson's Model of Information Behavior

Wilson (2010) reveals how he was one of the first researchers to draw attention to the role of information sharing, or information exchange, as he termed it. He cited Wilson (1981), noting that according to his paper, users would seek information from other individuals rather than systems, which is termed as information exchange. The research, however, sought to improve strategies on information sharing with both people and information systems. This model, therefore, proved unsuitable for this research, as a result of which the researcher decided to consider alternative models.

2.2.2. A Model of Information Sharing in Industrial Organizations

The ideal scenario of 'knowledge' sharing in industrial organizations has been explored in literature on information sharing. In so doing, a sizeable body of literature is devoted to information exchange issues in the supply chain management. According to Omar, *et al* (2010), information sharing among supply chain partners enables firms to achieve common goals. The level of information sharing across the supply chain can be influenced by the supply network configuration and goal congruence of the supply chain partners. The authors further state that information sharing is particularly important within the internal supply chain. If firms cannot share information internally, it would be difficult to share information externally with their partners. This is a useful model for this research because its emphasis is on organizations sharing information internally, as this will in turn positively affect information resource sharing externally. This is a component which can be addressed internally by organizations within ESI sub-sector. However, the model addresses a more specialized area of supply chain management, thus excluding other crucial areas in the industry. The researcher therefore sought more models that would address the information sharing aspects among similar information centres.

2.2.3. A Framework for Policies of Dynamic Access

A framework for policies of dynamic access of policies across multiple geographically distributed organizations calls for the use of computer and networking technologies by public firms to develop infrastructure to support information sharing. Bhoopalam, *et al.* (2007) argues that a major obstacle to information sharing is the lack of a framework and an infrastructure that allows government organizations to share information selectively with different government departments and the public at large. The lack of such a framework creates unwillingness among government organizations to share their digital content. A mechanism needs to be in place to allow policy makers to specify which documents can be moved from one organization to another and who can access these transferred documents. Furthermore, a system is needed that enforces these policies real-time when external events dictate a change of policies. In Kenya Government today, one can already see a positive change in the direction of information sharing. Bhoopalam, *et al.* (2007) proposed a model which is designed to satisfy the functional requirements of providing cost-effective authentication and authorization mechanisms for end users, a secure mechanism for harvesting digital library information and for transporting dynamically changing access policies among a set of participating libraries. The architecture should also use standards-based technologies and provide clean interfaces among these technologies while allowing for flexibility to accommodate extensions. The functionality of the model is illustrated inFigure 1 on page 21.

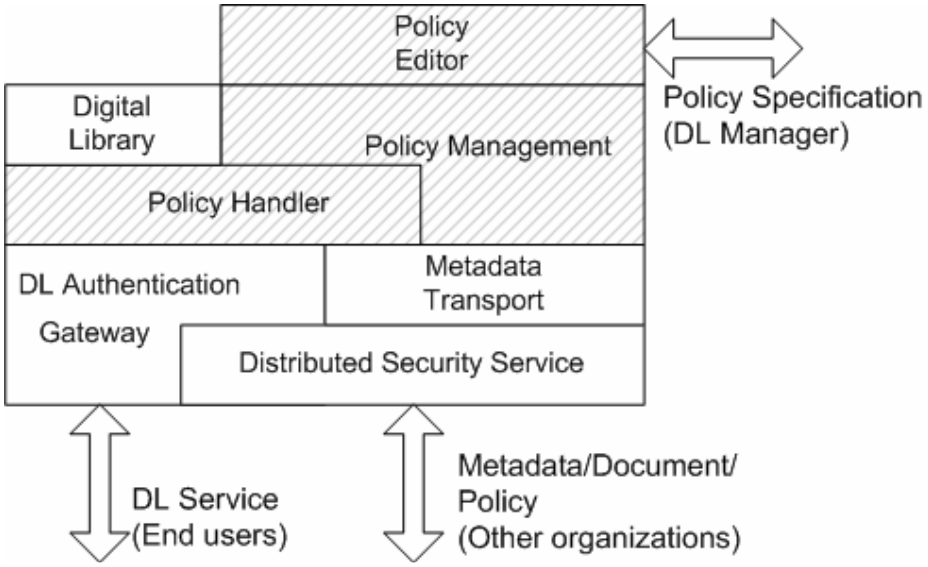

Figure 1: A Secure, Layered Model on the Interaction of Digital Libraries interaction

Source: Bhoopalam, 2007, p.3

Figure 1shows the architecture in support of the authors' proposal for the target environment, which is a set of digital libraries (top left inFigure 1) that interact with two of the core layers (shaded components in Figure 1), of the infrastructure. The layered architecture which exists at any of the digital library nodes illustrates how the components interact to achieve the functional requirements specified above.

- The **policy editor** component provides a visual representation to non-technical content administrators of complex access rules for a large body of end-users and harvesting entities.
- The **policy management** component provides management of policies so that the system is in a consistent state locally and globally.
- The **policy handler** accepts DL service and harvest requests, policies, and end-user attributes. It is responsible for enforcing the rules on the requests. As a central component in the architecture, it interacts with most of the other components.

- The **metadata transport** layer's responsibilities are to package and propagate the metadata of the digital libraries on receiving valid harvest requests.
- The **DL Authentication Gateway** provides end users authentication and manages attributes or roles for users at the home organization.
- The **Digital Library** component represents a digital library supported by an organization.
- The **Distributed Security Service** component authenticates machines that request harvests and policy updates. It signs, verifies, and encrypts policy updates and metadata. It enforces consistent awareness of security requirements among all DL nodes.

This model is a visible representation of how systems in ESI can be used in sharing information among different digital libraries according to policies set by high level managers of information centres. Among other things, the policies specify which documents can be moved from one organization to another and who should access them. The access policies are maintained using declarative standards based languages and use domain vocabulary, for instance, roles, and applicable permissions, among others. A portion of the collection of information centres in this sector consists of digital materials, and the sub-sector is in the process of designing digital libraries. The model is applicable to the information centres for facilitating information resource sharing among digital libraries. It can be used to develop a framework of information resource sharing and policies that facilitate an effective and flexible harvesting of metadata and access to information among the information centres in ESI.

2.2.4. Model of Collaborative Information Behavior

Reddy and Jensen (2008) state that the researchers' and practitioners' critical need is a model of Collaborative Information Behavior (CIB) to form the basis of investigations of users in collaborative contexts and to design technology to support these contexts. The authors mention Karamuftuoglu (1998) who outlined the beginnings of a theoretical framework for understanding the collaborative nature of information seeking. It implies that information seeking is just as much about producing new knowledge which is a creative and inventive activity, as it is about finding existing information. This author addresses two knowledge functions of information retrieval (IR) systems. These IR systems should support transferring knowledge and creating new knowledge, where the latter is dependent on social networks and relations. Reddy and Jensen (2008) further mention that this scenario is related to social work, with attempts to subsume support for information seeking in the broader area of group support. Furthermore, conceptual elements such as trust, awareness and coordination are important to understanding CIB across a wide variety of domains. The authors state that other researchers who examined how team members actively worked together to identify information needs found out that team members collaborated when developing information seeking and retrieval strategies to address an information problem within the team. Factors such as communication patterns and work activities that influence the need for information and for collaboration during information searching were revealed.

Reddy and Jansen (2008) state that Computer-Supported Cooperative Work (CSCW) researchers have also developed systems that focus on issues that are important for supporting CIB, e.g. BABBLE. Based on the findings of Reddy and Jansen's (2008) research, a CIB model which has explanatory properties in a variety of environments

was developed. The findings of the research indicate that there is clearly a relationship between individual and collaborative information seeking, with overlap between the two in their critical characteristics. This relationship is illustrated in Figure 2 below.

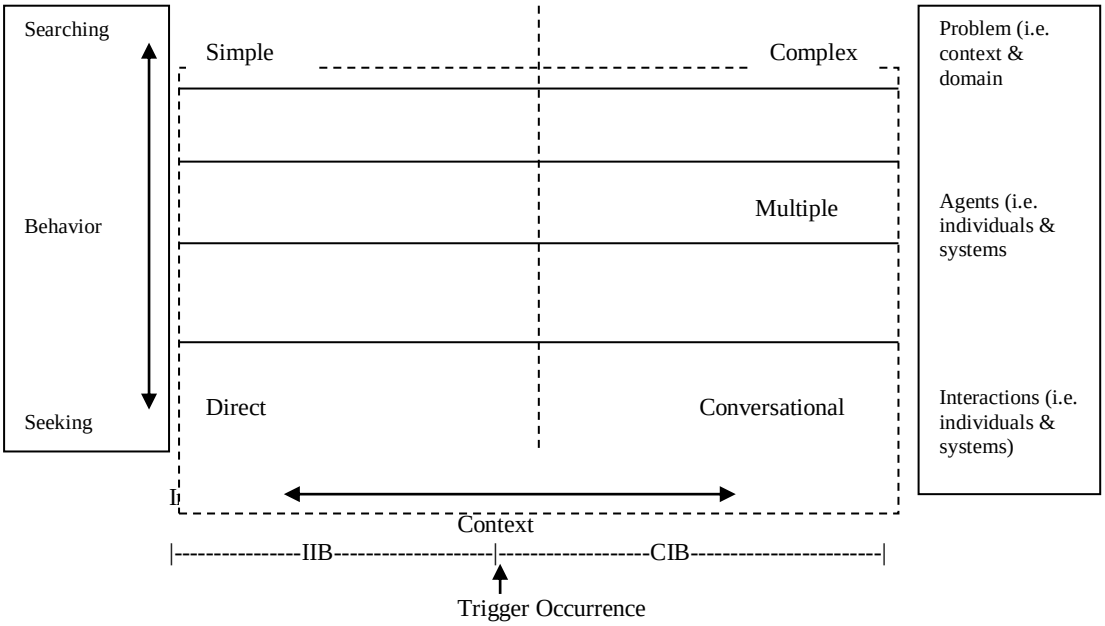

Figure 2: Individual versus Collaborative Information Behavior

Source: Reddy and Jansen, 2008, p. 266

Information environment is viewed along two axes:

(a) Behavioral axis: ranging on a spectrum from information searching to information seeking and use.

(b) Context axis: ranging on a spectrum from IIB to CIB.

The authors further explain the above model, indicating that there is an interactive effect between behavior and context in terms of either individual or the collaborative situation at each of the behavioral level (information searching, seeking, or mode of information behavior). Each of these interactions is influenced by characteristics of the environment in terms of interactions, agents and domains. The behavioral axis ranges from individual to collaborative but intersects searching, seeking, and use.

Along the behavioral axis, people simultaneously engage in information searching (tactical maneuvering) and seeking (strategic maneuvering) in accordance with their modes of information behavior (philosophy of seeking and use). These levels are best viewed not as distinct but as a continuum. Along the context axis, people are engaged as individuals or in some collaborative situation along a spectrum of activity. They are affected by their interactions with other agents, the number of other agents in the environment, and the domain of the information problem or need. These two factors interplay simultaneously across problems, agents and interactions. The interplay of the complexity of the problem, the number of agents interacting and the nature of these interactions initiates a trigger that transforms the context from IIB to CIB (Reddy and Jansen, 2008).

At the individual level, the information problem is relatively simple when compared to the collaborative level. As the information problem becomes more complex and nuanced, the need to collaborate becomes more pronounced. This is especially true in domains where multiple areas of expertise are needed to address the information problem. In these domains, several agents must interact.

Hansen and Jarvelin (2005) discuss CIB practices of information workers in patent offices. They found the awareness that workers have of each other's work activities play an important role in the success of the CIB activities. Focusing more on communication, Krishnappa (2005) designed a collaborative information-seeking and retrieval prototype called MUSE (Multi-User Search Engine). During the evaluation of the prototype, she found out that the collaborative features in MUSE, specifically the chat function, played an important role in enhancing the information seeking and

retrieval process for the collaborative work teams. The use of chat led to a better understanding of both the search process and the findings.

Reddy and Jansen (2008) continue to explain that agents, who are defined as both people and information systems, are entities that must interact to address the information problem. At the IIB level, there are usually a small number of agents, typically one person and one or more information systems. As the problem becomes more complex, the numbers of agents involved increases. Typically, in a collaborative setting, each team member usually has different expertise and each system agent may produce a specific type of information content. Team members often know which person or agent has the necessary information. Within CIB activities, each of these agents interacts to address or understand the information problem. With increasing problem complexity and more agents (both human and system) involved in the activities, the interactions become complex, less directional, and more conversational in nature. This conversational interaction occurs person-to-person and may also occur person-to-system, for instance, an exploratory search. Consequently, we see that Figure 2on page 24 displays the information environment in two dimensions, behavior and context. Using these dimensions, we can classify any particular information incident. An individual engages in searching in a direct manner, such as fact finding using one system, and with the behavior motivated by a simple need. We could normally classify this as IIB. On the other hand, in CIB, the searching is conversational, with the individuals engaging the system and each other in a dialogue, with typically more than one system involved, and the information need complex (Reddy and Jansen, 2008).

In the ESI sub-sector, an information need can become complex. The more the number of agents involved in searching for information, the more likely the problem being resolved. Today ESI is more inclined to IIB rather than CIB. This model can be used to monitor the transition on information behavior from IIB to CIB. It can also be applied in further research after the initial formalization of information resource sharing in ESI has been achieved.

2.2.5. Web-Based Information Services and Resource Sharing

According to Posner (2007), libraries find themselves facing new and increased competition from a variety of web-based information services. The question facing librarians today is whether such services represent a threat to library resource sharing or a new opportunity for librarians to help patrons overcome constraints of distance and access to information and materials. Historically, Posner (2007) affirms that a variety of technologies have made the discovery and delivery of information for library patrons more reliable, affordable; actually advances in computer technology are what first led to the modern era of ILL (Inter-library loans) in the 1970s when OCLC established its online database of library holdings and began to facilitate online requests of interlibrary loans. No one information centre in ESIcan provide all the information needed by its users.

Similarly, Posner (2007) divulges that even if Google has become a dominant force in the information world, neither Google nor any single information centre can provide access to all information. This means that there will always be rare materials that cannot be digitized by Google nor circulated by any one of the information centres in ESI. Owing to an increased awareness of the existence of online information, the author further states that people may request more obscure items from more ILL

departments of libraries, thus forcing more libraries to get involved in resource sharing. In order to supply patrons with all of the materials they identify on the web, librarians could work with new partners, such as international libraries, commercial document suppliers or in our case, information centre portals of players in ESI.

Information sharing is for public good, and it is useful, perhaps even essential, for human survival and success, and ILL still serves as a necessary access point to the world of information beyond the Internet and local library collections. Although the Internet can be a democratizing force, it is severely limited by the extent to people who can afford computers and Internet connection. Therefore, libraries can, and should continue, to play a role in facilitating access for patrons who might otherwise become disenfranchised information have-nots (Posner, 2007).This research agrees with Posner (2007) that there is wisdom in maintaining and developing sustainable core and specialized local library collections and services, including no-fee ILL services. That way, all individuals in ESI could access the information they need to survive, flourish, and participate fully in society.

Although libraries have long shared materials on a case-by-case basis, ILL has been an institutionalized library service for only about a century and it has only existed for a few decades. Therefore, we cannot know whether web-based information services such as Google are merely the next transformative, if not disruptive, technologies for ILL departments to incorporate, or whether they represent a complete paradigm shift for the future of information resource sharing. The only certainty is that now that web-based information services are established and successful players in the information world, library resource sharing will continue to develop in response to their proven popularity, whether ILL librarians choose to view them as assets,

partners, or competitors. Fortunately, librarians, as honest information brokers, have a code of ethics, a strong tradition, and a balanced long-term perspective from which to consider all new developments in the fields of information science, technology, education, and scholarly communication. It is this outlook that will enable librarians to embrace, use, critique and help shape these services, even as they remain open to other technologies that will also help them realize their mission of connecting people with information (Posner, 2007).

2.2.6. Intra-Type Resource Sharing Model

In the ESI sub-sector, knowledge resources have spread all over among the players, thus making it difficult for an individual library to satisfy all its users' needs. According to Sharif (2006), library professionals need to explore options to extend users' access to information sources by forming partnerships with other libraries and information centers with similar collections, a need that will improve the services of ESI sub-sector information centers. Just as is happening in ESI, Sharif (2006) states that informal resource sharing is being practised in libraries in Pakistan and other developing countries. These collaborative arrangements enable patrons to access resources not within their reach. It is widely known that no library, no matter how large and well-funded, can be self-sufficient in meeting all its users' needs. With the Intra-type Resource Sharing Model shown in Figure 3, Sharif (2006) states that libraries of the same kind can share their resources. Since the level of participating libraries is nearly the same, this model can be easier and more beneficial to adopt. The model also gives a better understanding of resources, services and clientele. To effectively implement this model and establish a program that is well documented, Sharif (2006) asserts that librarians should seek support from their parent

organizations. Defining good programs needs preparation and definition of policies, procedures, structures and standards.

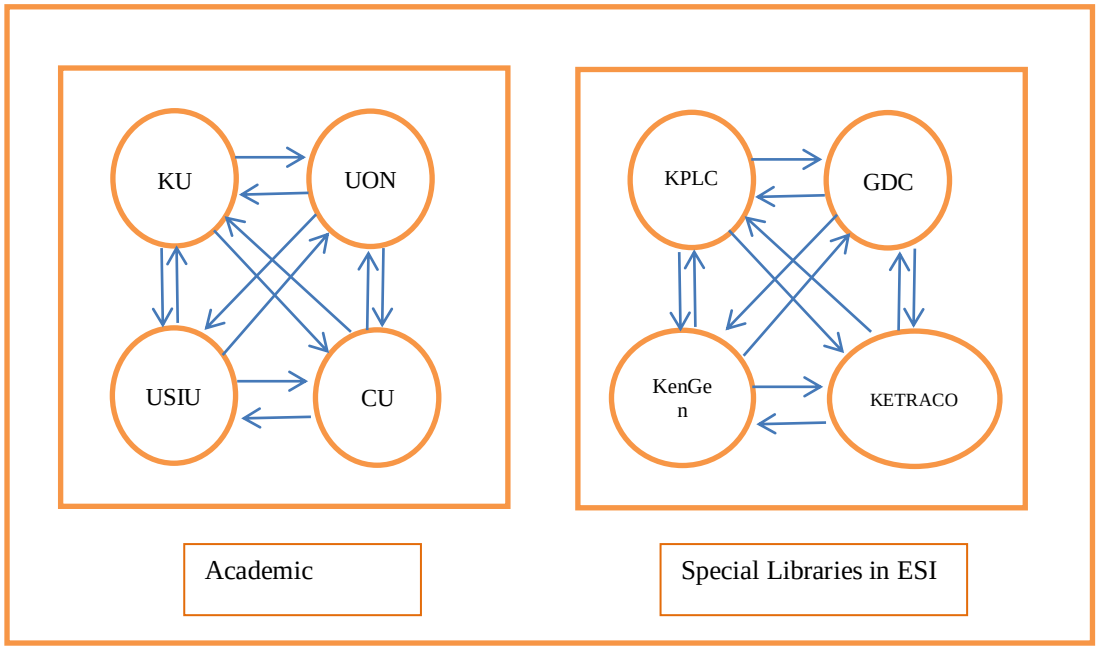

Figure 3: Intra-Type Resource Sharing Libraries

Adopted from: Sharif, 2006, p. 113

Key

KPLC	-	Kenya Power & Lighting Co. Ltd. Information centre
GDC	-	Geothermal Development Company Ltd information centre
KenGen	-	Kenya Generating Co. Ltd information centre
KETRACO	-	Kenya Transmission Company information centre
KU	-	Kenyatta University library
UON	-	University of Nairobi library
USIU	-	United States International University Library
CU	-	Catholic University Library

Libraries and information centres in ESI sub-sector can benefit highly from this setup illustrated in Figure 3 above, considering the fact that they are similar in that they all acquire and disseminate information related to energy, environment and management, among other services. The result of this program would have information centres of ESI generate computerized union lists of serials held by participating libraries, create databases of government and parastatals documents, feasibility studies, research reports, technical drawings and manuals, *et cetera*, develop and implement an interlibrary loan system among the participating libraries, prepare an index of periodicals subscribed by the libraries, and many other benefits.

2.3 Concept of Information Resources, Services and Resource Sharing

2.3.1. Significance of Information Resources

Nayar (2007) states that the resources of the industrial age were tangible things that could be mined, processed, bought, sold, managed and easily understood. In the emerging post-industrial society, there is little understanding of the characteristics of information, the basic yet abstract resource. According to Kaul (2001), the voluminous growth of published documents in the recent past, increasing cost of information sources, technological advancements that offer newer methods of information processing, retrieval and dissemination are some of the factors which have made resource sharing a necessity.

Leigh (2012) implies that every business needs information to help it succeed. A combination of internal and external business information resources can provide the background necessary to evaluate current performance and plan future progress. Understanding the various sources of information and how to access them can help companies and their leaders stay on top of emerging trends and environmental factors

that affect their success. Some of the external resources of information include government agencies and departments providing information on laws and regulations, industry statistics, industry analysis, etc. Associations are other resources that cover industries, trades and professionals across the wide range of business interests. The Internet is a significant source of information, both free and paid, for virtually any business needs. Internal resources of information are a necessity to a business, as they can provide important insights into employee and customer insights. Xin-li, *et al (*2006) believe that information resources exist everywhere and can produce, deposit and transfer information. Information is a factor of productivity that belongs to immaterial assets and is as significant as energy resource and material resource; hence, it cannot be substituted.

2.3.2. Transformation of Information Services

Information services have been hard-pressed to transform their services due to the changing needs of their users. An information service is that part of an information system which provides information, serves it to customers and collects it from contributors in order to manage and store it. It is defined as an agency or department responsible for providing processed or published information on specific topics to an organization's internal users, its customers or the general public (Business Dictionary, 2012). DAC and NCLIS (2009) argue that we must address the needs of existing knowledge societies; today's society is a learning society. These are users who rely on the documenting, preserving, communicating and sharing of information. Due to information explosion which affects our ability to meet our customers' information needs and economic uncertainty and/or downward-spiraling budgets, Soete (2002) states that we are forced to explore strategies, such as resource sharing, with greater intensity in order to improve the capacity and quality of information services. Kaul

(2001)mentions that user services are critical to the resource sharing programme, for its performance and effectiveness in providing access to shared resources. Libraries and information centres are therefore required to organize and provide adequate user services. DAC and NCLIS (2009) cited borderless libraries which connect different libraries to each other so that users can access information and materials from any library in different geographical regions.

2.3.3. Information Resource Sharing

According to Sartija (2009), information resource sharing in libraries has long been used to improve access and service through borrowing and lending from other libraries. Cooperation and sharing have been transformed by information technology and the move from a print to a digital environment. Major methods of resource sharing in the print era include interlibrary loan, document delivery, institutional membership and consortia. Consortia are formed at the local, regional or international level, and may be grouped around function or subject. Information resource sharing demands shared values, vision, commitment, special funding and full participation by all the stakeholders.

2.3.4. Objectives of Resource Sharing in Libraries

The objective of resource sharing as Manaam and Bose (1998), quoted by Kaula (1986), is to maximize the availability of material and services while minimizing expenses. In other words, the principle behind resource sharing has been the availability of maximum service at the minimum cost or the maximum service at the same cost. The objectives of resource sharing are to create an environment in which libraries can offer better services and more materials for the same cost. Resource

sharing aims to make the resources of one library available to users of other libraries and vice-versa. The main objectives, therefore, are to:

1. Increase availability of resources
2. Extend the accessibility of resources
3. Diminish costs
4. Promote full utilization of resources

2.3.5. Dimensions of Information Resource Sharing

Wilson (2010) states that the dimensions of information sharing, which include the number of people (or organizations) sharing, can vary from one-to-one, to one-to-many, and many-to-many. A second dimension is given by the setting of the sharing; for instance, information can be shared in health contexts, exchange of information in supply chains, in energy contexts like in the ESI sub-sector, and in social work. These dimensions determine the architecture of information services and infrastructure.

2.3.6. ICT and Information Resource Sharing

Standing at the edge of 21stcentury, there is probably no dispute over the recognition of ICT technologies in information activities. Changes and growth in technologies have had an impact on the libraries' structure of the services over the last two decades (Siddike, 2010). According to the author, application of ICT to library and information work has revolutionized the traditional concept of libraries from store houses of books to intellectual information centers, conveying the concept of electronic library. ICT has opened up a new chapter in library communication and facilitated global access to information, defying geographical limitations. Kaul (2001) suggests that the solution to the problems of information explosion, the ever-changing needs of users, increasing amount required for subscription to same number of

periodicals and journals, shrinking library budget, Kenya's economic challenges and their impact on the library acquisitions can be best overcome up to a certain level by means of employing ICT initiatives in all the library functions, including information resource sharing with other information institutions.

In 2003 Carr reported that an estimated $2 trillion is spent worldwide on information technology each year. We should therefore ask ourselves how much of that investment is well spent and how much of the technology is well used. Every information centre should find a way to monitor the usage of technology and weigh the demand for investment against the benefits (Bytheway, 2014).

2.3.7. Networking, Collaboration of Information Resource Sharing

According to Geronimo and Aragon (2005), the first initiative to develop library networks came about in the United States in the middle of 19th century, with the foundation of the American Library Association and the start of a cooperative cataloguing program. The delivery of catalogue cards by the Library of Congress was the next step towards the development of library networks and consortia. At the end of the 1960s, the Library of Congress developed the Machine Readable Cataloguing (MARC) format. MARC started a new concept in standards and resource sharing. Information resource sharing improves the effectiveness of dissemination of information. Soete (2002) articulates that it makes sense to collaborate, to enhance and strengthen what information centres like those in ESI sub-sector do for their customers by working together to reduce unnecessary duplication, to capitalize on the synergy of collaboration by learning from one another. Kaul (2001) states that the voluminous growth of published documents in the recent past, increasing cost of information sources, technological advancements that offer newer methods of

information processing, retrieval and dissemination are some of the factors which have made resource sharing a necessity. Geronimo and Aragon (2005) state that the organization of libraries into resource sharing consortia and networks are alternatives to address former problems, like the cost of acquisition, bibliographic processing and storage of documents, and the astonishing growth of information produced. One of Soete's (2002) key lessons learned in planning resource sharing programs and in helping others plan them is that there is no single best way to do resource sharing. Information centres in ESI sub-sector should therefore consider what is most appropriate for them to have a successful information resource sharing programme.

2.4. Studies in Information Resource Sharing

2.4.1. Sharing Information Resources: Rural KwaZulu-Natal, South Africa

The purpose of a survey-based study undertaken at the Inkandla and Mbazwana school clusters in KwaZulu-Natal South Africa by Nzimande and Stilwell (2008) was to investigate the awareness of community members with regards to the concept of clustering. Although the intention of the initiative was to increase access to essential information resources, the preparedness of the communities to share these resources, to tolerate the hardships of travelling long distances, to accept the challenges and responsibilities and learn from the lessons, were also part of the study (Nzimande and Stilwell, 2008). These authors stated that in South Africa, information is not always readily available at all schools because many school libraries in the country are at different stages of development mainly due to inadequate funding.

In KwaZulu-Natal, schools suffer for the same reason; therefore, a strategy was conceived to focus on education delivery at the level of school clusters. Schools were grouped or clustered together for mutual benefit, enabling a number of existing

synergistic initiatives to be built on and consolidated. The study revealed that the awareness, the vision of clustering and preparedness of the community to share resources interacted with problems of accessibility and community dynamics. Access to amenities like laboratories and libraries was often viewed by policymakers, among others, as an unnecessary luxury, especially by those who were deprived of these facilities in the course of their education and managed nevertheless to achieve success. This study suggested that the implementation of the concept and practice of clustering required adequate nurturing at all levels of the South African government together with constant monitoring if it was to be sustained and developed to perform such crucial roles as information resource sharing (Nzimande and Stilwell, 2008).

2.4.2. Information Resource and Knowledge Production

According to Xin-li,*et al* (2006), human beings have great comparative advantage on information resource because of the long and splendid civilization. There is therefore no reason not to exert the advantage of human intelligent in exploiting and utilizing information resource and ensuring the achievement of both the economy and society. The research described the characteristics of a good information resource as being easy to share, easy to co-construct, value-added, volume-added, low space-time sensitivity and having high space-time benefit. Knowledge production is an important way to exploit and utilize the information resource. Resource digitization, transmission by network, management automation, analysis intelligentization, division of labour specialization, service individualization and mode diversification have become the important areas in the development of information resource. Xin-li, *et al* (2006) emphasizes thatone of the key techniques to be applied in this case today is virtual library technique characterized by network. Due to the digitization of information resource, the abundance of network resource, the rapid development of

transmission technique and information process technique, information service based on network platform is coming into existence. When information and knowledge are shared, materials may come from various ways; for example, when we write a thesis, the references may come from many sources, but when information and knowledge are not shared, the materials necessary may only come from sources such as confidential reports. In essence, the sharing of information resource becomes inevitable in many different applications, like the setup in ESI.

2.4.3. Information Resource Sharing Models in Developing Countries

According to Kaul (2001), managing environmental knowledge, disseminating it and building capacity for its efficient use is as important as creating knowledge. This study examines the use of information resource sharing networking in the area of environmental studies in developing countries. Kaul (2001) states that the reasons why developing countries are lagging behind in library cooperation is because of poor funding and lack of the spirit of give and take or exchange. But great efforts have been made in China, for example, in the development of documentary information resources because it was considered that these resources could work as China's knowledge reserve to promote the development of the economy, science, technology and culture. The study concluded that in developing countries like India, steps are being taken to disseminate knowledge about environment. The capacity to achieve this is being built up with the help of international funding agencies. With the explosion of knowledge and financial constraints, networking for information resource sharing has emerged as an important alternative. Information technology has facilitated for information resource sharing among the institutions located in different geographical areas. It enables participating libraries to obtain materials from each other's information resources.

From this study, Kaul (2001) recommends that library networks be established for co-operation and resource sharing among libraries of all types, covering all subjects, in cities, states, regions or countries. Specialised library networks of similar libraries or of libraries in one discipline could also be established. Necessary databases and bibliographic tools like union catalogues and union lists should be created and primarily rationalise acquisitions in libraries specialising in one discipline. Networks should be characterized by efficient ILL and document delivery services. They should aim at developing online access to member-libraries' specialised collections and services, either through networking or directly. All libraries should follow a standard MARC format, ACCR-II cataloguing code, a standard thesaurus like LCSH, and e-mail and Internet facilities should be availed to libraries. Library networks should offer shared cataloguing, co-operative collection development, reference service, training, etc. A network model should be selected, keeping in mind the purpose for which the sharing is being done by the participating libraries. The networks that offer services on all subjects and serve all types of users and libraries will progress, as they will attract a large number of users that will make them sustain their services.Resource sharing in libraries has become a necessity and has gained worldwide acceptance. Networking is information resource sharing through computers and telecommunication links which transmit information or data from one library to another (Kaul, 2001).

2.5. Chapter Summary

This chapter reviewed the concept of information resources, information services and information resource sharing. It explored six models that address sharing, exchange of information and collaboration of information centres. Intra-type Resource Sharing Model and Secure Layered Model for Digital Libraries' interaction were both used to

direct the research among the players in ESI. The reason why the Secure Layered Model for Digital Libraries' interaction was selected is because it provided a design that satisfies the functional requirements of providing cost-effective authentication information sharing services to the end users. This forms part of the Framework of Information Resource Sharing developed as a result of the study. The Intra-type Resource Sharing Model was used because the information centres are of similar type and their parent organizations work towards the same goal, that is, to generate and supply affordable electricity to customers. The chapter finally reviewed studies that have been undertaken in information resource sharing. These studies illustrate the benefits reaped in applying information resource sharing in libraries and information centres. The review revealed a gap in literature in relation to the energy sector in Kenya. As much as the literature addresses information resource sharing in industries inferred, it however doesn't address the specific area of information resource sharing in the energy sector in Kenya of which ESI is a sub-sector of.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

This chapter describes the research methodology used to investigate information resource sharing activities in ESI sub-sector, identify shortcomings and suggest strategies for their improvement. The chapter discusses the research design used, the target population, the sample and sampling methods, collection procedure and data analysis methods that were employed. The content of this chapter refers to the strategies that the researcher used to ensure that the work can be critiqued, repeated and adopted, as stated by Laban, Quartaroli and Riemer (2012). These strategies guided the choices made with respect to sampling, data collection and analysis.

3.2. Research Design

A combination of qualitative by use of narratives and quantitative research design by use of a survey was used to investigate the lack of a formal information resource sharing program which has denied players of ESI relevant and timely information for their operations, resulting in low quality of work and hence affect the quality of service to customers. The survey design provided a quantitative description of trends, ratings and activities of the population of users of information centres in ESI by generalizing from a sample of this population. Using the questionnaire was the preferred data collection instrument because it was less costly and could easily identify attributes of a large population from a small group of individuals (Creswell, 2009). The narrative design focused on obtaining in-depth data through face-to-face interviews.

The study used both qualitative and quantitative approaches to obtain an overall statistical picture of information resource sharing and at the same time enabling in-depth investigation on the current status of information resource sharing. Qualitative and quantitative data collected were used in order to provide a comprehensive analysis of the research problem. Just as Tracy (2013) states, qualitative methods are appropriate and helpful for achieving a variety of research goals, either on their own or in a complementary relationship with other research methods.Creswell and Plano Clark (2011) described the convergent design as one which involves collecting and analyzing two independent strands of qualitative and quantitative data in a single phase, merging the results of the two strands and then looking for convergence, divergence, contradictions or relationships between the two databases. The researcher implemented the quantitative and qualitative method during the same timeframe as illustrated in Figure 4 below. The purpose of this approach was to obtain different but complementary data on the status and gaps in information sharing in ESI sub-sector, guided by all the six research questions, to best understand the research problem.

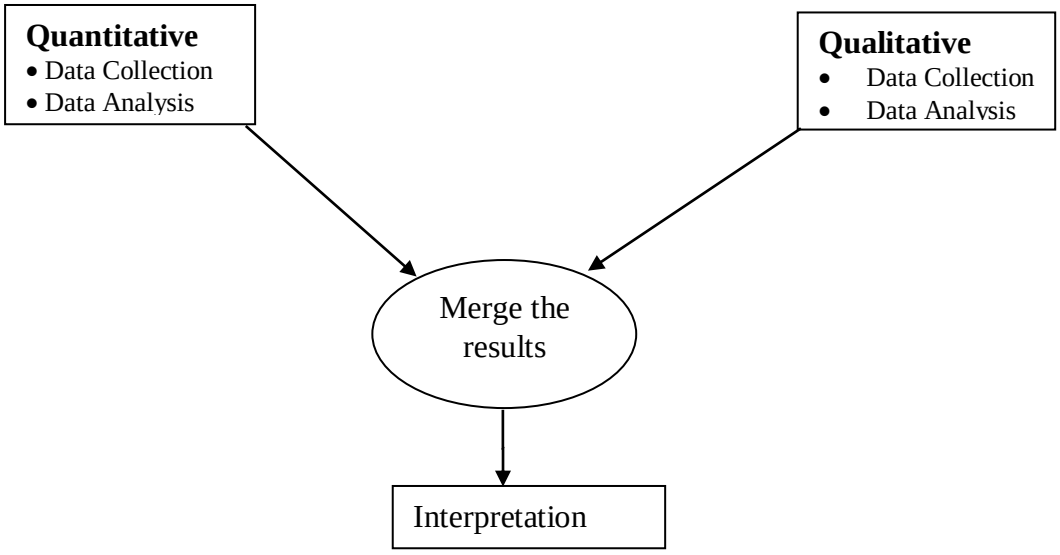

Figure 4: Convergent Design

Adopted from: Cresswell and Plano Clark, 2011, p. 180

Qualitative approach was used to ensure that the objectives of the study were achieved by the questions asked in the interview schedule which covered:

i. Information resources and services available in the ESI sub-sector
ii. Existing access and use of information resources and services
iii. Existing forms and adequacy of information resource sharing activities exist
iv. Extent of ICT use in resource sharing activities
v. Challenges faced in resource sharing, and
vi. Recommended strategies for the improvement of information resource sharing activities and develop a framework for resource sharing in ESI

Quantitative approach was used to obtain data from users by using questionnaire as shown in Appendix3.Creswell (2003) states that the inquirer often makes knowledge claims based on multiple meanings of experiences with the intention of developing a theory or pattern that can be change-oriented. In contrast, quantitative studies attempt precise measurement of something. According to Lapan, Quartaroli and Riemer (2012) quantitative researchers attempt to remain independent of the phenomena they study with the aim of generalizing findings. Denzin & Lincoln (2000) argue that qualitative researchers study things in their natural settings, attempting to make sense of the meanings people bring to them.

3.2.1. Sampling Design

3.2.1.1. Population and Sample Size

In the qualitative approach, the researcher selected nine (9)key informants for purposive sampling. These were persons responsible for managing the nine existing information centres or other stakeholders who have a responsibility in managing information in the ESI sub-sector. Researchers typically do not have access to data

about the entire populations, except in rare circumstances. However, most researchers want to generalize their research findings beyond the focus of their studies to the entire population of interest, which includes generalization to other people, places and times (Swanson and Holton III, 2005).

The researcher used both quantitative and qualitative approaches on a population target of 3329; the population parameters was 3320 registered library users. For the quantitative approach, with a sample frame of 3320, a sample of 250was identified using an online sample size calculator and tables from The Research Advisors (2006). Simple random sampling technique was used to gather of information for the study. The underlying assumption here was that the selected users were representative of all users in all information centres in the ESI sub-sector. The samples were distributed via email to each ESI player randomly as indicated in Table 1 below. The respective information centres would then distribute to their users.

Table 1: Simple Random Sampling

ESI Information Centres	**Population**
Kenya Power	2000
KenGen	460
Olkaria	720
GDC	20
REA	20
Ketraco	0
TARDA	50
ERC	50
Total Registered Users	**3320**
Sample Size	**250**

3.2.1.2 Justification for Sample Size

The sample size for qualitative approach of this study constituted nine(2 or 1 key staff from each ESI sub-sector player) respondents for purposive sampling and for quantitative approach,250 from the random sampling. The sample size of the qualitative approach which is nine (9) is justified by selecting a key informant from each of the nine information centres. The sample size of the quantitative approach which is 250 is justified by using an online sample size calculator and tables from The Research Advisors (2006) to calculate sample size from a population size of 3320.This source uses the following formula:

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

Where:

n=sample size

X^2=Chi-square for the specified confidence level at 1 degree of freedom

N=Population Size

P=population proportion

ME=desired Margin of Error (expressed as a proportion)

Where N=3320, X=95%, ME±6, giving the final result n=250. Saunders, Lewis and Thornhill (2003) explain that final sample size is almost always a matter of judgment as well as calculation because the researcher's choice of sample size within a compromise is governed by the confidence needed in the data collected, the margin of error that the researcher can tolerate, the types of analyses the researcher would undertake and the nature of units, resources, and conditions the research will operate under. The sample size was determined by using the confidence level of 95%, confidence interval (margin of error) ±6.

3.2.2. Sampling Procedure

This qualitative approach used non-probability sampling and probability plan for the portion covering the quantitative approach. The qualitative data collection approach used purposive sampling strategy, while the quantitative data collection approach used the simple random sampling strategy. Purposive sampling was used to select individuals to provide in-depth information on policies and programs in resource sharing, while the random sampling strategy was used to collect data on user perception on the current status of information services and resource sharing, thus meeting the objectives of the research. The researcher collected qualitative and quantitative data concurrently. In view of the in-depth nature of this study, data were collected using face-to-face interviews to satisfy the qualitative approach of research. The quantitative aspect of research in data collection used questionnaires to obtain data that can easily be quantified. The research employed semi-structured interview schedules and questionnaires for this purpose.

3.2.3. Research Procedure

The researcher made a formal application for authority to conduct research to the Ministry of Higher Education, Science and Technology with the National Commission of Science, Technology and Innovation and obtained a research permit as indicated in Appendix 2 and Appendix 7 before embarking on the research. She also sought permission from the Human Resource Department of each player of the ESI sub-sector to carry out research following approval from the Ministry. A pre-test using the research instruments was conducted and, thereafter, the necessary editing and corrections done on the interview schedule and questionnaire. Formal communications shown in Appendix 1 and Appendix 2 were then made to the potential respondents in order to introduce them to the research exercise so that the

interviews are conducted as scheduled and questionnaires administered as planned. At this point, the results were obtained and captured in MS Excel for data analysis.

3.3.Data Collection Methods

3.3.1. Type of Information Collected

Qualitative data were collected using face-to-face interviews with the informants who are responsible for information centres in ESI. The data collected were in line with decision making, management, policies and other managerial functions of the libraries. Quantitative data were collected using questionnaires distributed to registered users of information centres in ESI. This covered frequency of information use, types and methods of information use, available information services, and types of information services, among others.

3.3.2. Recording the Data

Collecting data involved the systematic gathering and recording information in a way that it can be preserved and analyzed by the researcher. For qualitative data collection, forms used for recording the information needed were prepared using Microsoft Excel application. Transcribing actual responses from face-to-face interview was done. Forms created in Microsoft Excel had records of the description of events and processes observed, and reflective notes about emerging codes and themes that arose during data collection exercise.

3.3.3. Research Instruments

Data were collected using semi-structured interview schedules shown in Appendix 2, which was filled by the researcher during the interviews. These are data collection techniques in which an interviewer physically meets the respondent, reads to them the same set of questions in a predetermined order, and records each interviewee’s

responses. Bryan and Bell (2003) state that a semi-structured interview schedule typically refers to a context in which the interviewer asks a series of questions that are in the interview schedule but could also vary the sequence of questions. The questions were frequently a little more general in their frame of reference than the ones typically found in a structured interview schedule. The interviewer similarly had some liberty to ask further questions in response to what was seen as significant replies. Flick (2002) states that the consistent use of this method increases the comparability of the data and that their structure is increased as a result of the questions in the guide. A questionnaire shown in Appendix 3 was likewise prepared for the purpose of collecting data from the information users in each ESI player's library and information centre. The questionnaire employed the use of structured and semi-structured questions, and Likert Scale which called for definitive positive or negative statements with which to agree or disagree. Under this approach, Creswell (2003) states that the investigator primarily uses post-positivist claims for developing knowledge, that is, cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation and the test of theories.

3.4.Validity and Reliability

Concerning reliability, the researcher checked to ensure that the results were consistent over a period of time and whether the results of this study could be reproduced under a similar methodology. So far as validity was concerned, the researcher determined that the research instruments could generate results that truly measured the extent of resource sharing of libraries in ESI. On validity and reliability of the data, the researcher noted the minimum response rate to the target questions. Saunders, *et al* (2003) stated that a valid question enables accurate data to be

collected, while a reliable one collects data consistently. The researcher used two instruments of data collection to validate the results obtained. A pre-testing of the interview schedule and questionnaire was done before launching the research with the target respondents. This was done to eliminate any errors and contradictions in the tools used.

3.4.1. Pre-Testing of Interview Schedule and Questionnaire

The purpose of pre-testing the interview schedule and questionnaire was to detect weaknesses in the research design and instrumentation. Before conducting the research, the instruments were pre-tested using the criteria in Appendix 4 on 6 (six) respondents. The feedback and experience from the pre-test was used to improve the content, reliability and validity of the interviewing schedule and questionnaires. From the feedback there was resistance in answering the questionnaire because the respondents thought it would take a long time for them. Another feedback was that respondents would require to list methods used for information dissemination. An addition on how effective these methods are would be a relevant addition to the research. The initial interview schedule required the interviewee to state how many policies exist. An additional aspect would be to name and explain the use of these policies. As a result of this, for the interview schedule, the relevant questions were added or changed to (1) List policies that guide information centre's operations. (2)Give examples of types of information unavailable in your information centre but available in other players (3)Which methods used to disseminate information are effective? For the questionnaire the estimated time one would take to fill the questionnaire was included. The following questions were adjusted to (1) How relevant and adequate are the library materials? (2) Give a description of how you use the library facilities. (3) Have you used interlibrary services before? If your answer is

yes, rate the services and if it is no, give reasons why. This process tested the reliability and validity of the whole research using the research instruments.

3.5.Data Analysis

The study used a combination of thematic analysis for the qualitative data and descriptive statistical analysis for the quantitative data. Thematic analysis focused on identifying themes within the data. Codes were typically developed to represent the identified themes and then linked to the raw data as summary markers for further analysis. The descriptive statistical analysis was used for quantitative data obtained from responses of the questionnaires distributed randomly. This helped in describing and summarizing the data in a meaningful way. The researcher merged both qualitative and quantitative data as illustrated in Figure 5 below. In a single phase, both types of data results were converged during the interpretation or analysis stage using data triangulation, ultimately increasing the validity and quality of results. This method of data analysis consists of analytical techniques applied to both quantitative and the qualitative data.

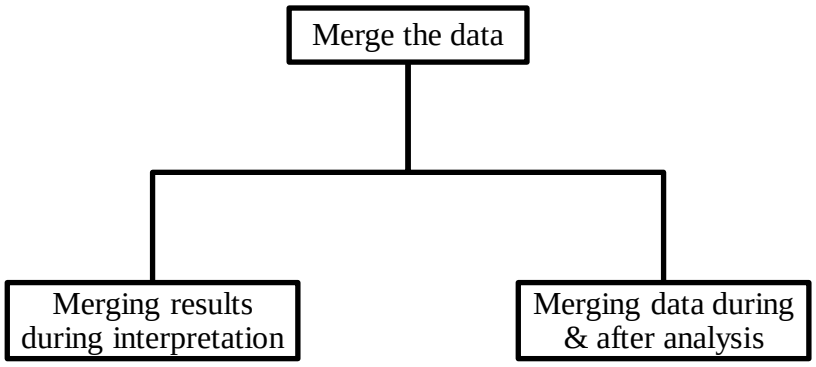

Figure 5: Stages of merging data sets

Adopted from Cresswell and Plano Clark, 2011, p. 180

Data were prepared for analysis, explored and then analyzed using the form illustrating thematic analysis in Appendix 6.Data collected were analyzed by summarizing key findings on management and information services of information centres in the ESI sub-sector. Responses from the interview schedule were interpreted, coded and themes generated. However, Lapan, Quartaroli and Riemer (2012) claim that despite some researchers gathering data by means of interviews and observations, techniques normally associated with qualitative methods, they code the data in a manner that allows them to be statistically analyzed. That way, they are, in effect, quantifying qualitative data. According to Babbie (2010), the key process in the analysis of qualitative social research data is coding, classifying and categorizing individual pieces of data coupled with a form of retrieval system.

For the quantitative research part, the type of data to be considered for research was selected for use at the level of numeric measurement, for instance, the researcher needed data on the category of users, the number of types of information resources available, types of information services, frequency of information resource sharing activities, among others. MS Excel was the analysis software used for this exercise. After analysis, the results were presented in form of graphs and narrations.

3.6.Research Ethics

The study complied with professional ethics to ensure that the rights and welfare of possible respondents when conducting the study are observed. The *practical* ethical principles the researcher considered and applied are as follows. She:

i. Maintained the integrity of the research as a whole, aware of a possible need to conduct similar researches in future.

ii. Minimized the risk of harm. The study did not expose respondents to any harm, whether physical, emotional or psychological. The study was conducted at the best possible convenience of the respondents.

iii. Obtained informed consent, ensuring that content of the consent was made available with full and clear explanation.

iv. Ensured anonymity and confidentiality by not mentioning respondents by name and making sure their responses were confidential.

v. Avoided deceptive practices by explaining beforehand to the respondents what the research was about.

vi. Provided for respondents the right to withdraw partially or completely from the process as they may choose to do.

vii. Provided information, by making known the purposes, procedures and risks of the research to the participants in a way that they could understand.

3.7.Chapter Summary

This chapter explored the considerations made to arrive at both quantitative and qualitative approaches for the research design. The sampling techniques used were for qualitative approach purposive sampling and for quantitative approach, simple random sampling. The sample size number intended was nine (9)for purposive sampling for the heads of department of information centres and 250 for respondents who are users Information Services in ESI. Seven (7) out of nine (9) heads of information centres were interviewed while 250users of information centres responded by filling the questionnaires. The challenges faced in data collection were not a hindrance to the completion of the study as there was general cooperation and support from the rest of the respondents as explained and presented in CHAPTER FOUR.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1. Introduction

This chapter presents data collected, data analyzed and discussions. Data analysis used both qualitative and quantitative methods, employing thematic analysis for qualitative data and descriptive statistical analysis for quantitative data. Data analysis was done separately and discussions and findings were merged using the concept in Figure 5 on page 50. Data presentation is both narrative and statistical, using tables and graphs to illustrate the statistical inferences. Data was collected from the information centres of the ESI sub-sector, using questionnaires for the quantitative approach and interviews for the qualitative approach.

This chapter is organized under the following headings, based on the research objectives and using the qualitative approach as well as the quantitative approach of data analysis.

- Data capturing and cleaning
- Response rate
- Representations and Categories
- Qualitative data analysis
- Quantitative data analysis
- Challenges experienced in the ESI sub-sector information centres
- Suggested strategies for improvement

4.2. Data Capture and Cleaning

Data collected for both qualitative and quantitative approaches was captured by using the data collection instruments and later transferred to Microsoft Excel. Data editing

was done manually by clarifying with the data collection instruments. Data cleaning was then carried out to identify and correct errors, and any inconsistency.

4.3. Response Rate

The interviews targeted nine (9) information professionals from nine information centres from the seven parastatals using purposive sampling technique to obtain greater depth of information management in information centres.

Table 2: Response Rate

ESI Sub-sector Player	**No of Respondents**	**Response (%)**
Kenya Power	161	64
KenGen	35	14
Olkaria	39	16
GDC	3	1
REA	2	1
Ketraco	0	0
Tarda	5	2
ERC	5	2
Total Questionnaire response	250	100%
Quantitative Sample Size	**250**	
Interviews conducted	7	78%
Qualitative Sample Size	**9**	
Overall response rate	**89%**	

Seven (7) out of nine (9) informants were interviewed for 30 minutes each, giving a response rate of 78% which was considered adequate for the study to proceed with qualitative data analysis using the themes categorization and analysis. On the other hand, the quantitative component of data collection had targeted a sample size of 250 from a sample frame of 3320 registered library users in ESI. The response rate (100%) is indicated in Table 2, showing responses of each ESI player. This response rate was due to the media used to disseminate the information. Each information centre used email to distribute to their uses, most of them did not consider the number as initially instructed because that would be additional work for them. Combining the response rate of both quantitative (100%) and qualitative (78%) data collection gives a total response rate of 89% as indicated in Table 2.This is a fairly high response rate that is adequate for a research of this magnitude, although Babbie (2002) mentioned that a response rate of 50% and above is adequate for a research to proceed to analysis stage.

4.4. Representations and Categories

4.4.1. Respondents from Parastatals

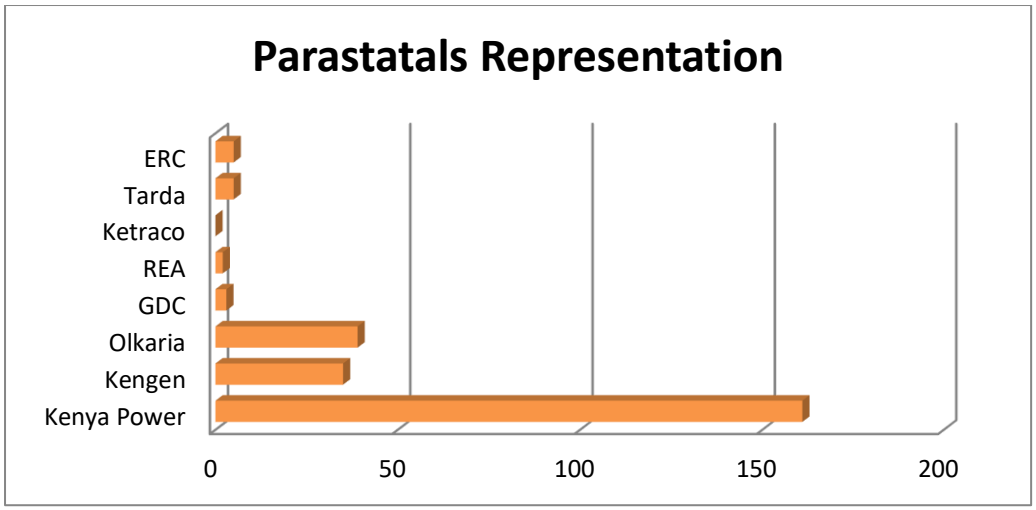

Figure 6: Parastatals Representation of respondents

Using univariate data analysis, it was observed that the highest representation was from Information Centres of Kenya Power, followed by KenGen as shown in Figure 6 on page 55. The least represented was TARDA. Although Olkaria Station administratively falls under KenGen, its Information Centre, which is larger and older than the main KenGen Library, operates autonomously, especially serving the staff members based in Olkaria Station.

4.4.2. Job Levels Representation

The study considered obtaining information on the representation of the different job levels indicated in Table 3 below because it is a factor that would likely affect the quality, type and extent of data which is dependent on the respondents' understanding of various concepts and company business.

Table 3: Job Levels Representation

Job Level	No. of Respondents	Percentage (%)
Management	156	62.4
Executive	5	2
Union	49	19.6
Contract	31	12.4
Intern	4	1.6
Not indicated	5	2

The Management had the highest representation, with 156 respondents, which is 62.4% of the total respondents. This satisfied the researcher because the Management level was well placed to respond on questions ranging from policy to operational issues.5 (2%) Executive staff responded, 49(19.6%) of the Union staff responded, 31 (12.4%) of the staff on contract responded, 4 (1.6%) of students who were on

internship program at the time of data collection responded, but 5 (2%) of the respondents did not indicate their job level as shown in Table 3 on page 56.

4.4.3. Gender Representation

The study obtained the gender ratio, aware that an unusually high representation of a certain gender could influence the responses given by respondents.

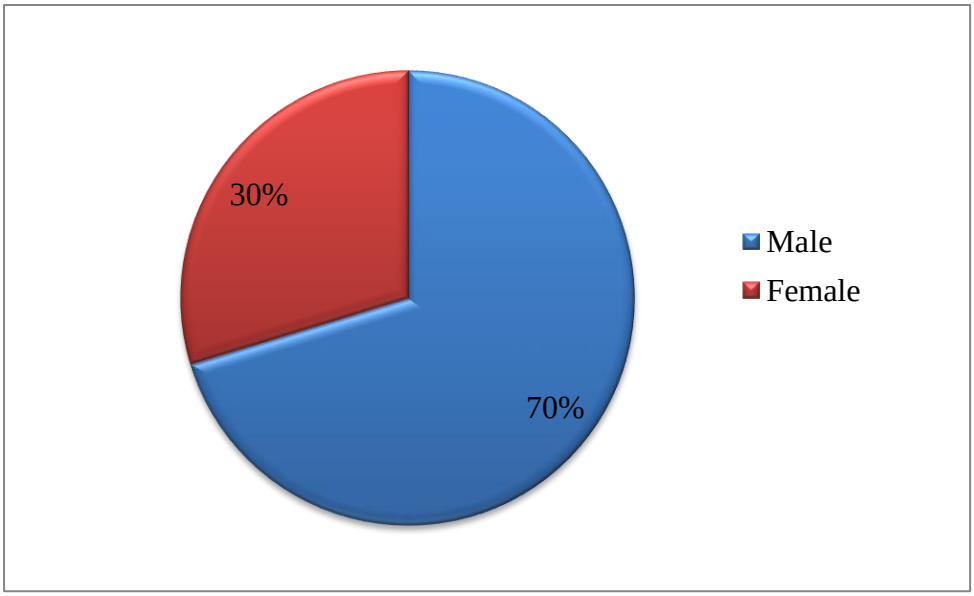

Figure 7: Gender Representation

The gender representation was biased in favour of male, with 175(70%) men compared to 75(30%) female as shown in Figure 7 above. It is therefore likely that the data collected had a general bias towards opinions, ideologies and suggestions shared by men, regarding information resource sharing.

4.5. Qualitative Data Analysis

The ESI players who did not respond to scheduled interviews were KETRACO and REA. This was due to the fact that they do not have established information centres, and this is likely to be the reason why members of staff here perceived themselves as incapable of responding to interview questions. The study settled on the inductive

analysis for qualitative approach using the model derived and adopted from Elo and Kyngäs (2008)'s model on preparation, organizing and resulting phases in the themes analysis process.

4.5.1. Preparation Phase

Elo and Kyngäs (2008) state that the unit of analysis can also be a letter, word, sentence, portion of pages or words, the number of participants in discussion or the time used for discussion, depending on the research question. The unit of analysis in this case is the entire interview results obtained from the interviews conducted in the different ESI sub-sector players. All responses from questions asked during the interview were considered for analysis.

4.5.2. Organizing Phase and Generating Codes

For the qualitative data, initial codes are generated by spawning where the patterns occur. This resulted in the generation of various headings. She closely read and understood each interview transcript, transcribed the responses and summarized the interview as she considered it adequate to respond to the research questions. The researcher began to collapse the data into labels to create categories for more efficient analysis. Eight predominant themes were derived from the coding scheme as indicated in Appendix 6.These themes were easily identified since the interview was systematic in addressing the research questions. The themes are management of information centres, existing policies and guidelines, information services, information resource sharing services, ICT use in resource sharing, challenges, strategies of improvement and significance of a formal information resource sharing program. The credibility of the research findings can be verified through the fact that all the interviewees responded to questions in these eight categories. At this stage the researcher looked at

how the themes supported the data and the theoretical perspective, including the models used to drive the research to a logical conclusion. She cross-checked the objectives of the research against the themes emanating from the qualitative data as discussed in advance. Where there was possibly some missing data, the researcher reorganized the themes until they became exhaustive and comprehensively represented the research objectives and findings. Each of them is stated and categories representing the themes correspondingly illustrated in Appendix 6.

4.5.3. Reporting Stage

It is at this stage that results are reported. This is when the researcher ensured systematic and logical reporting of the findings from both qualitative and quantitative approaches and presented a clear connection between the data and results. The following are the findings reported from qualitative data collected.

4.5.4. Organizational Resource Centre Profile

On the basis of the first objective of the study which is, to examine information resources and services available in ESI as shown in Table 4 on page 60, the study went on to the next step of identifying the types and sizes of information centres that exist so that an overview of their setup, their business and purposes could be observed. The respondent from KenGen information centre had this to say:

> "Our collection keeps changing drastically and so I cannot give you a static figure of its size. We keep getting new materials of late that has given a significant increase of the number of materials. Now we are at about 6000."

Table 4: Organizational Resource Centre Profile

Information Centre	Type of Information Centres	Age (Years)	Size of Collection
GDC	Information resource centre	4	450
Kenya Power	Executive library	16	1300
KenGen	Information resource centre	13	6000
ERC	Information resource centre	14	700
KPLC	Records and archives	7	8,000,000
TARDA	Special library	23	10,000
Training School	Academic resource centre	19	15,000

Each ESI sub-sector player that respondents had their information centre profiled in Table 4 above. At this stage, the researcher made sure that she was familiar with the data, paying specific attention to any significant patterns. The interviewees used during the data collection exercise are considered key informants of this study and are responsible for the running of the information centres in their institutions. In Kenya Power, the largest collection of information centre was identified as Records and Archives Centre.

4.5.5. Management of Information Centres

The first and second objectives of the study were achieved by the findings of this section. The objectives were to examine information resources and services available and to establish the access and use of information resources and services in the ESI sub-sector. This section included the findings of the existing information resource centres and types and uses of information resources as shown in Figure 8 on page 61.

4.5.5.1 Existing Information Resource Centres

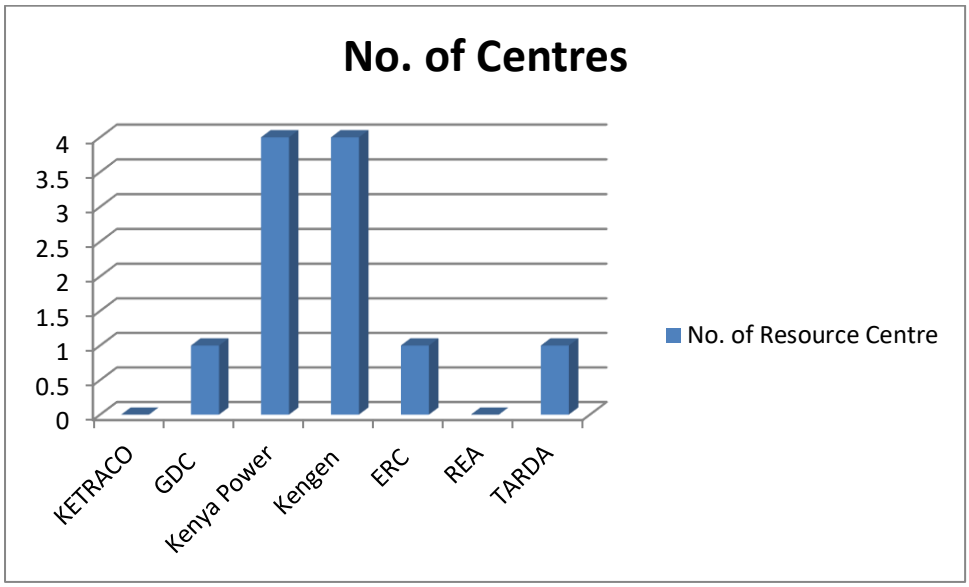

Figure 8: Information Resource Centres

It was observed that Kenya Power and KenGen had the most number of information resource centres. Kenya Power reported having an academic library in its training institution, two special libraries and an archives and records centre as the respondent narrated:

> "We are privileged to have three libraries in the company. We even surprise our customers and the public at large with these facilities. Our library, the Executive library is used only by the Executive Management while the other one in Electricity house serves all staff. The one in our training school in Ruaraka supports the training needs of the institution."

KenGen had regional libraries in its Central Office, Turkwell, Olkaria and Seven Folks Stations; ERC, GDC, TARDA each had one information centre; and KETRACO and REA had none as illustrated in Figure 8 above.

4.5.5.2 Types and Use of Information Resources

The study found out that different types of information resources, both print and non-print, were available in all the information centres that were assessed. This was

derived from Themes Analysis Coding and Categorizing in Appendix 6 and the results are shown in Table 5 on page 63. The interviewee from TARDA information centre had this to say:

> "You can see we have so many materials here but very few old books that need to be updated. We used to receive newspapers but now it was stopped due to budget constraints. Most of our collection consists of reports and manuals on the dams."

The respondent from ERC mentioned that:

> "Our collection concentrates on government publications and reports on energy regulation and policies in the energy sector. We don't have much liberty to buy what we want."

The study observes that the collection composition size and type is dependent on the information of the parent organization and availability of funds.

Table 5: Information Resources

Information Centres	Main resources	Other resources	Most used resources	Main subjects
Training School Library	• Books • Serials	• Projects • AV Materials • e-libraries	• Books	• Technical subjects • Business & Management • ICT • Fiction
GDC	• Reports • Manuals	• Manuals • Drawings • Books • Serials • AV Materials	• Reports • Government Publications	• Geothermal • Energy policies • Studies • Projects • Environment • Government policies, acts
KPLC Executive Library	• Books • Serials	• Reports • AV Materials • e-libraries	• Books • Serials	• Transmission & Distribution • Environment • Renewable energy • Management & leadership • Energy Economics
KenGen	• Drawings • Books • Company Documents • Manuals	• Reports • Serials • Records • Standards • Government Publications • e-libraries	• Company Documents • Books	• Energy Generation • Renewable energy • Geophysics • Management & leadership • Inspirational materials
ERC	• Reports & Studies	• Government Publications • Books • Serials	• Reports • Government Publications	• Energy Regulations • Petroleum • Renewable energy • Geothermal, hydro, energy • Environment
KPLC Records & Archives	• Records • Archival materials	• Company Documents • Photographs	• Records	• Customer records • Company records • Legal documents
TARDA	Reports Studies	• Books • Serials • Manuals	• Reports • Manuals	• Dams • Irrigation • Hyro power

In the training school library which is an academic library, books are the most used resources by the users while a special library like ERC library had its reports used more frequently than books. In GDC and ERC, Government publications were the most frequently used resources. The Executive library reported books and serials as being the most used resources. KenGen reported company documents and books as being the most frequently consulted as KPLC Archives reported records as being the most frequently used resources. The subject areas indicated in Table 5are technical and related to the business area of the ESI players. By subject areas of TARDA, these are dams, irrigation and hydropower.

4.5.5.3 Qualification of Staff

The study sought to establish the composition by qualification of staff by observing the different levels of education represented in each information centre that participated in the research. The level of qualification is likely to affect the type of information services provided to the users. As evident from Figure 9 below, the staff members working in the information centres are academically qualified.

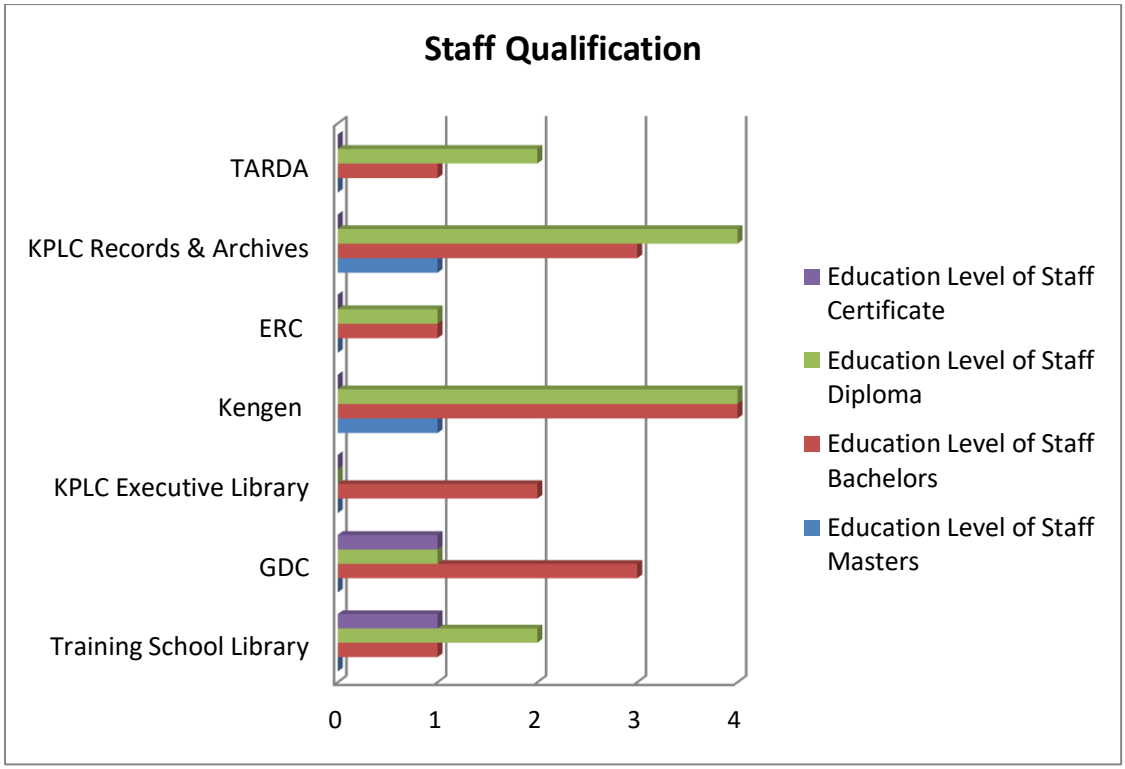

Figure 9: Academic Qualifications

KPLC's records and archive and KenGen information centres recorded the highest academic qualifications, with two staff members having a master's degree education level. The respondent from KPLC's records and archives centre said that:

> "I am the only one in this department with an advanced degree in this field. For a long time we have not been having people who have studied and obtained qualifications up to this level and work in the public sector. You should also know that I spent a long time trying to obtain my Master's Degree so it is not easy, for those of us who have not opted to lecture in the Universities."

Most staff members had been working in the stations for more than 10 years; therefore, their working experience was an added advantage to the educational qualifications. Figure 9above shows that a majority of the staff members working in the information centres had a diploma level qualification, while two staff member had master's level of education.

4.5.5.4 Budget Allocation

Budget allocation is likely to affect the resources available to the users, thus addressing the first objective, which is to examine information resources and services available in ESI. Apart from TARDA, REA and KETRACO as shown in the analysis in Appendix 6,the rest of the information centres indicated that the funds allocated to them were sufficient for them to purchase the necessary materials and manage every function in the centres. TARDA has been facing financial constraints due to limited or no funds, hence the inability to update materials and a library management systems. The respondent complained that:

> "It is so difficult to obtain funds for the library. As compared to other departments and sections, the library is given the last priority. We have been operating on zero budget for materials of the library, even just basic running of operations has been a challenge. We struggle to have stationary for staff to use. You can now see that two of our staff sharing one computer."

KETRACO and REA, being among the most recent parastatals unbundled from KPLC are totally dependent on the government's limited funding, thus they have not yet come up with information centres.

4.5.5.5 Acquisition Process

The Acquisition Process is a means by which Information centres identify and obtain the required information resources, thus affecting the objective, to examine the information resources and services available in ESI. As evident from responses and seen in the themes analysis in Appendix 6, all the information centres expressed their inabilities and challenges in carrying out the acquisition process by general procurement rules of The Public Procurement and Disposal Act, CAP 412C. A respondent from GDC said this:

> "There are times the funds in the budget for a financial year are not utilized because of the long and slow tendering process. Sometimes our users get impatient with us because it looks like we deliberately didn't buy the books that they requested. This gives a bad reflection on our services to them yet we cannot help it"

From the Training School, the interviewee had this to say:

> "Being an academic institution, we sometimes run late in procuring books and journals that are supposed to be used in a specific term. I personally complained to our procurement officers on how their processes do not serve our needs accurately because of the delays they cause. The only response they gave was that they must ensure that they follow the procurement act to the letter. How discouraging."

The procurement process takes a long period, that is, from the time library materials quotations/tenders are prepared and floated to the time the information centre obtains approval from the tender/procurement committees to proceed with the process. For instance, a KenGen interviewee responded "By the time we have sought an approval to buy the books, their costs have been revised upwards or they have gone out of print". Delays in obtaining current information are very common and therefore all these information centres seem not to satisfy their users as they should. Hence, the information centres always lack adequate materials.

4.5.5.6 Information Management System (IMS) and Intranet

The fourth objective, which was to determine the extent of ICT use in resource sharing, can be established from the findings in Table 6 on page 68.

Table 6: IMS and Intranet

Information Centres	IMS	Intranet
Training School Library	Koha	Library Intranet
GDC	Nil	Company Intranet
Olkaria	Module in SAP	Library Intranet
KPLC Executive Library	Koha	Library Intranet
KenGen	Module in SAP	Library Intranet
ERC	Amlib	Company Intranet
KPLC Records & Archives	RIM 360^0	Company Intranet
TARDA	NIL	Nil

Despite all centres using computer equipment for their daily operations, the researcher gathered the facts as transcribed from the interviews and reflected in Appendix 6 as displayed in Table 6 above. Only TARDA and GDC do not have or use IMS.TARDA expressed that it did not have an Intranet as well.

> "We in TARDA have insufficient funds to even buy computers as mentioned earlier. We have heard that Koha is a good Library Management System but it is not easy to convince management to prioritize it above other needs of the organization. We still use manual recording of circulation of books and reports and this will soon create bigger challenges than we already have, challenges like accurate record keeping. The absence of a library system contributes to us not having an Intranet or an OPAC."

Training School Library, Olkaria, KPLC Executive Library, KenGen information centres have Library Intranets or OPACs (Online Public Access Catalogues) used by the library users for reference and inquiries. GDC, ERC and KPLC Records and Archives have company Intranets which could be used by the information centres but are not specific to their operational needs. With the Intranet in place, this provides an avenue for information sharing within the company, which the libraries and information centres can use for their information sharing initiatives.

4.5.6. Access to Information Resources

The findings on access to information resources address the second objective, which isto establish the access and use of information resources and services. The analysis in Appendix 6 shows how each information centre expressed the need to increase the number of existing information resources. They also indicated that physical accessibility of materials is limited due to the various stations their users operate from. TARDA library is located in Industrial Area, Nairobi, and serves staff who are based in the Central Business District, Embu and Machakos counties. This is what they narrated:

> "Our information Centre is way deep into the industrial area of Nairobi. We seem to be in the middle of nowhere in relation to the present location of our users. Many of our users are in the City Centre of Nairobi and it's been a challenge for them to access our facilities. We have asked management meant to relocate us in a better place but no response to this. Just imagine our users in Embu and Machakos counties, they have need of the materials yet it looks like such a mountain for them to access them."

KenGen has got satellite libraries in different parts of the country. From the respondent:

> "We are very lucky to have a few satellite libraries in various parts of the country. For instance, the one in Turkwell serves our staff in that station. That place is far and remote so they would have been challenged in trying to access a library elsewhere. We have other libraries serving the staff working in the other power stations. They are so lucky."

Apart from the Archives and Records Centre, all the information centres apply the use of Current Awareness Services (CAS) and Selective Dissemination of Information (SDI) to enrich their information services. KenGen and all KPLC libraries have established online facility for online accessibility, use of emails, library brochures and magazines, among others. They have begun accessing electronic materials which reduces the constraints of information accessibility from the information centres.

4.5.7. Policies and Guidelines

In addressing the third objective, which was to determine the forms and adequacy of information resource sharing activities in the ESI sub-sector, the study sought to identify policies and guidelines in information resource sharing used in the information centres .Appendix 6analysis shows that all the information centres that participated in the research expressed the guidance of various policies and guidelines as indicated in Table 7 on page 71. KPLC Records and Archives seemed to have mentioned several policies as follows:

> "We must use the ISO 15489, the records management standard which has the concepts of creating, capturing and managing records.AS 4390 is an Australian standard – still on records keeping, in fact it is similar to the ISO one…then we have Disposal and Retention Schedule. This helps us and guides Kenya Power on when and how to dispose their records, and to make a decision on whether to retain them and for how long. There are records like customer contracts which are in that category of never being disposed of. The Public procurement and disposal act is a must for us to have and to refer to. It is used for tendering process for procuring items. It is also used to help us on how to dispose equipment and assets. QMS procedures are guidelines on maintaining the quality management system. I am the custodian of some of the procedures required by the company, for example, Procedure for Maintaining Records. These are in relation to ISO 9001:2008. The other one is the Official Secrets Act."

ERC stated that:

> "Our policies are not many. We just make sure we use them correctly, like the Collection Development Policy that we have is usually used especially when we want to add to our library collection. There are some guidelines we use for processing materials. We make sure that they are uniform. The public procurement act is also a must to have when we are buying books, periodicals, journals and others."

Table 7: Policies and Guidelines

Information Centres	Policies and guidelines
Training School Library	• Public procurement & Disposal Act, 2006 • QMS Procedures • AACR2 Standards and DDC
GDC	• Public procurement & Disposal Act, 2006 • Collection Development Policy • AACR2 Standards and DDC
KPLC Executive Library	• Public procurement & Disposal Act, 2006 • QMS Procedures • DRIM
KenGen and Olkaria	• Public procurement & Disposal Act, 2006 • Information Access and Distribution Policy • QMS Procedures
ERC	• Public procurement & Disposal Act, 2006 • Collection Development Policy • Processing guidelines
KPLC Records & Archives	• Public procurement & Disposal Act, 2006 • QMS Procedures • Disposal & Retention Schedule • Official Secrets Act • Books & Newspapers Act • ISO 15489 & AS 4390
TARDA	• Public procurement & Disposal Act, 2006 • Processing Guidelines

From the findings the use of the Public Procurement & Disposal Act, 2006 in all information centres was noted, given the fact that these are housed by Government Institutions or Parastatals. However, none of the policies indicated in Table 7 above have a direct impact on information resource sharing among information centres.

4.5.8. Forms and Adequacy of Information Resource Sharing (IRS) Services

The study sought to establish the existence of forms and adequacy of information resource sharing services which was the third objective of the study. The results from the interviews showed the status of information resource sharing, whether it exists or whether there is just an informal program, are set forth in Table 8 below Training School Library informant mentioned:

> "We do not have anything formal on information resource sharing. We just have an arrangement with the libraries of USIU and Utalii College. We have been having a long standing relationship with them since our locations are convenient for us."

The respondent from TARDA library said that:

> "We do not have any formal or informal program on information resource sharing. In fact we you kind of used to have an agreement with the KenGen library but we fell off due some disagreements with the institution. Since then we do not share any information with them."

Table 8: Information Resource Sharing

Information Centres	Formal Interlibrary loan	Policies IRS	Formal Program IRS	Informal IRS with Non ESI Institutions
Training School Library	Informal	Nil	Informal	• USIU • Utalii Library
GDC Library	Nil	Nil	Informal	• None
KPLC Executive Library	Informal	Nil	Informal	• KenGen libraries • MoE
KenGen Library	Informal	Nil	Informal	• TARDA library
ERC Library	Nil	Nil	Informal	• MoE • KBS
KPLC Records & Archives	Nil	Nil	Nil	• MoE • KNADS
TARDA Library	Nil	Nil	Nil	• KenGen libraries

The study shows that none of the information centres has a formal information resource sharing program in place. Most of them seem to be running an informal Information Resource Sharing (IRS) program with different partners. The KPLC

Library, Training School Library and the KenGen Library have informal IRS programs that match their unique needs.

4.6. Quantitative Data Analysis

Data was collected using simple random sampling method and then analyzed descriptively, first by assigning numerical codes to both numeric and non-numeric data. The database was cleaned and then recorded in MS Excel. A code book was then prepared. Data was entered independently by a graduate student and then checked by the researcher for errors. The spreadsheet was scanned four times for errors and necessary corrections and adjustments were made. The analysis compared the results using frequencies and comparisons of results using forms of statistical distribution, like the mean, percentage and summations.

4.6.1. Active Users of Information Centres

The study sought to establish the ratio of active patrons to inactive patrons and the reasons why inactive patrons do not use the services. This partly addressed the second objective, which was to establish the access and use of information resources and services.

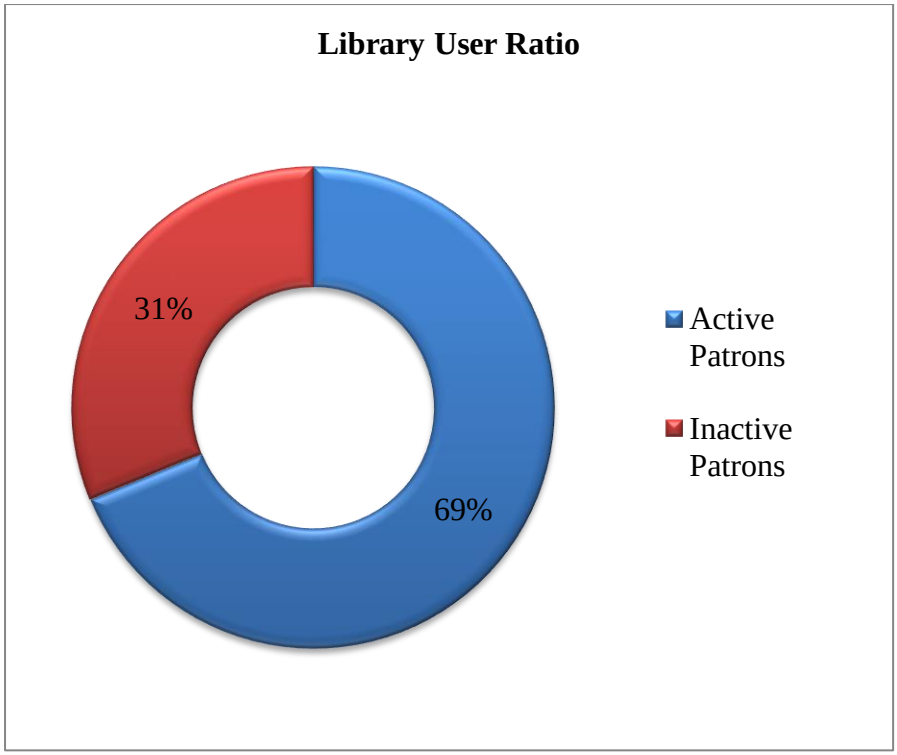

Figure 10: Library Active Users Ratio

As much as the research targeted registered members of the information centres, it was observed that 78 (31%) of them, as shown in Figure 10, said that they were not active, while 172 (69%) of them indicated that they are active. This helpful result brings insight to the connection between inactive registered members and the information services provided. The respondents therefore had an opportunity to give their feedback on access and information resources and services. The research gives an indication that improving the information services would probably increase the number of active users of information centres.

4.6.1.1 Reason for not using Library

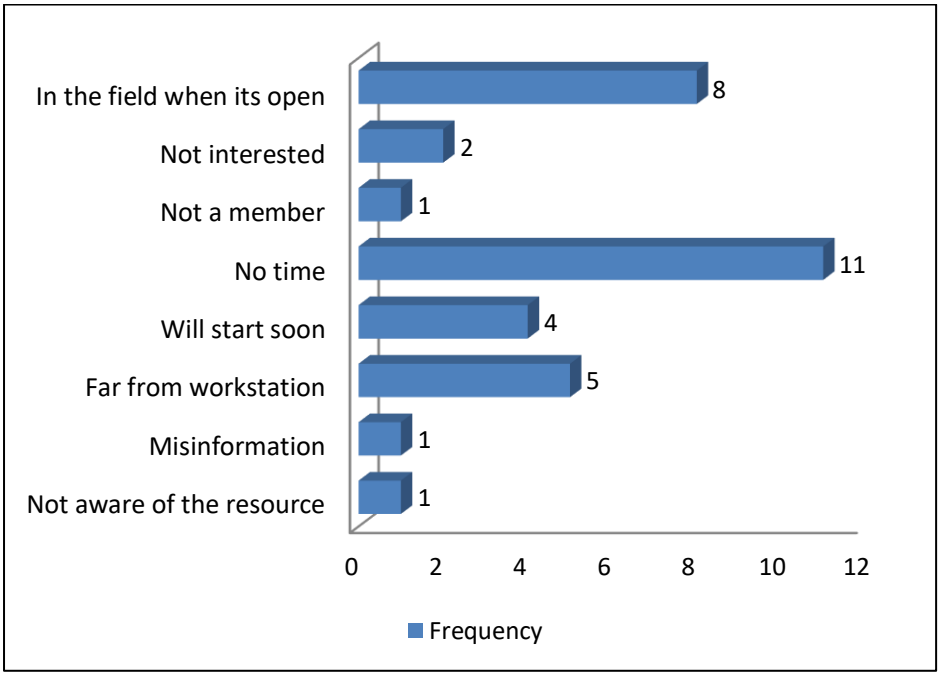

Figure 11: Frequency Graph on reasons for not using Library

Among the 33 respondents who gave reasons for not being active users of their information centres, a third of them cited lack of time to use the facility. There is one respondent who indicated non-membership without giving any further reasons, as indicated in Figure 11 above. Another respondent who indicated that the library is meant for the management as shown in Figure 11was most likely misinformed. One of the respondents was not aware of the existence of the information centre in their organization.

Referring to the sample frame which reflected registered members of various information centres, the responses provided indicated that some members are misinformed about their membership, or they do not recall ever registering as members of their information centres. An indication of the inconvenience that emanates from the opening hours was demonstrated in Figure 11, with 8 out of 33

indicating that the information centres are open at the time they are out in the field stations working.

4.6.2. Information Services and Facilities

The results regarding information services and facilities using the users' perspective addresses the first objective, which is to examine information resources and services available in ESI.

4.6.2.1 Facilities

The study sought to examine the facilities that exist in the information centres. The respondents were asked to rate the facilities on a likert scale from 1 to 5, where one represents poor and 5 represents excellent. The respondents rating resulted in an overall average rating of 3.4 (68%) as shown in Table 9 below.

Table 9: Rating the Information Centre Facilities

Information Centre Facility	Average Score	Percentage Rating (%)
Strategic location	3.5	70
Environment	3.35	67
Reprographic Services	3.1	62
Sufficient hours of operation	3.25	65
Audio Visual Equipment	3.75	75
Staff professionalism	3.35	67
Internet Accessibility	3.55	71
Relevance of materials	3.35	67
Average Rating	**3.4**	**68**

The 68% rating was an average of the responses in respect of different facilities listed in Table 9. The highest rating was given to Audio Visual Equipment at 3.75 (75%) and the lowest average rating was given to Reprographic Services at 3.1 (62%).This shows that the investment in the information centres has focused on Audio Visual Equipment and invested less in reprographic equipment. The strategic location was given a rating of 3.5 (70%), which is fairly high. The general view is that respondents are 70% satisfied with the location of their information centres, which is a positive observation. The respondents, however, did not give any facility 100% rating, which shows that these facilities are far from being perfect. There is therefore room for the information centres to improve their facilities. It is important to note that Internet Accessibility was given the second highest average rating of 3.55 (71%).This strengthens the observation that there should be an ICT infrastructure to facilitate information resource sharing program effectively.

4.6.2.2 Library Services

Besides information facilities, the study sought to examine how information services are used in the information centres. Respondents were asked to rate the services in information centres they use on a likert scale from 1 to 5 where 1 is poor and 5 is excellent. The overall average rating was 3.5 (70%) as shown in Table 10 below.

Table 10: Rating Information Services

Library Services	Average Score	Percentage Rating (%)
Response rate & accuracy to inquiries	3.55	71
Awareness of new materials/services	3.5	70
Awareness of automated system	3.3	66
Accessibility and organization of materials	3.6	72
Communication to staff members	3.6	72
Average	**3.5**	**70**

In rating how the library communicates to employees, responses worked out to an average of 3.6 (72%).The effort information centres make in creating the awareness of automated system was rated at an average of 3.3 (66%). The average rating for response rate and accuracy of inquiries was 3.55 (71%).Accessibility and organization of materials had an average rating of 3.6 (72%), just like the rating of communication to staff members. This is to say that the users are 72 % satisfied with accessing materials from the information centres and the communication they receive from these centres. The respondents gave an average rate of 3.5 (70%) for the overall provision of information services. But these information centres could still improve on their services to ensure that the users are 100% satisfied.

4.6.3. Methods of Accessing Services

This study sought to establish the methods users preferred to access information services. The respondents were asked to select methods they use to access services in their information centres. The results are as illustrated in Table 11 below.

Table 11: Methods used to Access Services

Method of accessing services	No. of respondents	Frequency (%)
Email communication	23	15
Physically visits	49	32
Calling	22	14
Guidance from Librarians	20	13
Use of ICT(e.g. Internet)	31	20
Catalogue	5	3
Document System	8	5
Total Respondents for this question	**154**	**100**

The most popular method used by 49 (32%) respondents is physical visit to the centres. As shown in Table 11, the use of the catalogue records is the least popularly used by 5 (3%) respondents indicating that they used this facility. Respondents who stated that they accessed the services through email communication were 23(15%), 22 (14%) respondents made calls to the information centres, 20 (13%) respondents sought guidance from the librarians and 31 (20%) respondents used the ICT technology, like the use of the Internet or Intranets to search for information. The remaining 8(5%) respondents stated that they used the document system. The responses show that physical visits and contacts, followed by email communication, are the preferred methods of accessing services from the information centres.

4.6.4. Use of Library Facilities

The study sought to establish how facilities are used. The respondents were asked to select the method they use when using the information centres. The results are shown in Table 12 below.

Table 12: Use of Library Facilities

Use of facilities	No. of Respondents	Frequency (%)
Reading	50	20
Research	28	11.3
Discussion	30	12
Recreation	2	0.8
Study	80	32
News	20	8
Copy and Scan	1	0.4
Borrowing books	53	21
No Response	41	16

There is possibly a connection between the use of the library facilities and the method of use as shown in Table 12. 80 (32%) of the respondents indicated that they used the library facilities for study. 50 (20%) respondents indicated that they used the facilities for reading. This implies that the total number of those who use the facilities for studying and reading is 52%, a figure which is related to the 32% of the respondents who prefer to physically visit the centres. Copying and scanning services, also known as reprographic services, are least used, as indicated in Table 12 by 1 (0.4%) respondent. In some players the copying and scanning services are not provided by information centres only, which implies that these services can be sought from other departments apart from the information centres. 28 (11.3%) respondents recorded that they use the facility to carry out research. 30 (12%) respondents indicated that they use the facility for discussion. 2 (0.8%) used it for recreation activities. 20 (8%) used it to obtain news. 53 (21%) used it for borrowing books. 41 (16%) respondents did not respond to this particular question.

4.6.5. Information Resource Sharing

Going by the third objective, the study sought to determine the forms and adequacy of information resource sharing activities by determining the awareness and use of interlibrary loan activities and how users access information from other parastatals in ESI.

Table 13: Interlibrary Loan Activities

Status	No. of respondents
Aware of ILS	33
Unaware of ILS	147
No response	70
Total	250

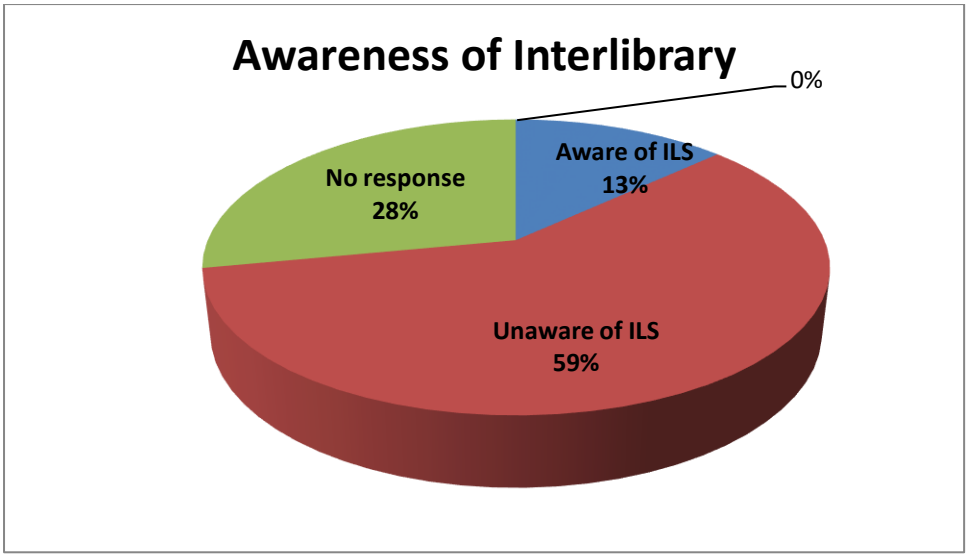

Figure 12: Awareness of Interlibrary Activities

According to the data obtained in Table 13, the number of users who are not aware of the inter-library lending activities that are provided by the information centres is fairly high. Both Table 13 and Figure 11show that the majority of the respondents 147 (59%) are not aware of these services.33 (13%) of the respondents, which is quite a low figure compared to that of those aware of the services, indicated their awareness of the ILS services. 70 (28%) users did not respond. Some of those who did not respond may probably not understand the meaning of the term ILS (Inter library Loan Services), even if there is a possibility of them using these services. This could be derived from the qualitative data that indicated that some of the information centres already have an informal information resource sharing program in place in Table 8.

Table 14: Use of Interlibrary Services

User of interlibrary services	Respondents	Percentage (%)
Use ILS services	23	9
Don't use ILS services	118	47
No response	109	44
Total	**250**	**100**

The number of respondents that indicated that they use this service was 23 (9%) as shown in Table 14. The respondents who do not use the ILS services were 118 (47%), while those who did not respond to this question were 109 (44%).This high number of those who did not respond indicates a corresponding high number of unawareness and unfamiliarity with the ILS services. Combining those who did not use the services and those who did not respond is evidence of the low use and lack of familiarization with the ILS services by the respondents.

Table 15Table 15 illustrates the scenario of users' thinking or attempts to access information from other parastatals within the same sector.

Table 15: Accessing Information from other ESI Sub-Sector Players

Scenario for ESI	No. of Respondents	Percentage (%)
Did not get information	12	5
Did not know how to access	51	20
They didn't think they would get assistance	25	10
Reluctant to ask	12	5
No contact persons known	44	18
Did not need information	48	19
Other	20	8
Respondents of this question	212	85

Of the 250 respondents, 48 (19%) indicated that they did not need any information, while the rest of the respondents (81%) had different experiences. This table indicates that 12 (5%) respondents did not get any information after attempting to search for

it.51(20%) respondents said that they did not know how to go about accessing the information.25 (10%) respondents said that they did not think that they would get any assistance, 12 (5%) were reluctant to ask for any assistance. 44 (18%) said they did not know any contact person from a different parastatal who would assist them. These responses have revealed the assumptions the staff members make when it comes to searching information from a different organization. The high figure of the respondents who said that they did not need information emanates from their wrong assumption that they can actually work as well without information from other players in ESI.

The study sought to establish the adequacy of information accessibility from the Internet. The respondents were invited to rate the adequacy of information accessibility on websites within ESI sub-sector and the results are indicated in Table 16.

Table 16: Adequacy of Information Accessibility on Websites

Adequacy of website information	**Average Rate**	**Rate %)**
Geothermal Development Co.	3.75	75
Kenya Transmission Co.	3.55	71
Energy Regulation Commission	3.65	73
KenGen Website	3.85	77
Kenya Power Website	3.9	78
Rural Electrification Authority	3.65	73
Tana and Athi River Dev. Authority	1.85	37
Average	**3.46**	**69**

The fourth objective was to determine the extent of ICT use in resource sharing activities in ESI. The study sought to establish the adequacy of information accessibility from the Internet. The respondents were invited to rate the adequacy of information accessed on websites of ESI and the results are indicated in Table 16. This table shows that the highest rate of accessibility is found in Kenya Power Website, which had the average rating of 3.9 (78%). KenGen website followed very closely with an average score of 3.85 (77%). TARDA scored the least with the average score of 1.85 (37%).The average rating for accessing information on these websites was 69%, a low rating in this era of information sharing and online presence. The users may have found the websites inadequate in providing information, either because of their incompetence or because the websites were not considered user friendly. The low rating of this facility could possibly contribute to the low number of users who could gain access to these websites. Not all staff members working in ESI have easy access to the Internet while at their workstations.

4.7 Challenges experienced in the ESI sub-sector Information Centres

The fifth objective of this research was to identify the challenges experienced by ESI sub-sector players in information resource sharing activities. This was achieved by obtaining the challenges raised by both the staff members and users of the information centres.

4.7.1 Challenges in Information Centres Management

The results from this section were obtained from the interviews conducted with the key informants of ESI information Centres. These challenges are responses to the questions they were asked which are, (1) What challenges do you face when accessing

information for your user? (2) What constraints are you experiencing when performing information sharing activities?

4.7.7.1 Marketing and Publicity Strategies

There were poor marketing and publicity strategies identified in the information centres. In the cases researched, the information centres had registered members; however, no appropriate means of constantly communicating with those stationed in different regions was evident. An exception was found in KenGen information centre where they periodically produced an in-house magazine for its users and the rest of the staff to keep them abreast of information services available. Constraints in marketing and publicity activities emanated from constrained budgets.

A response from the interviewee from KenGen was that:

> "We have an editorial team that collects information from various staff on new knowledge and at the same time gathers information on available information services and seminars. This has really helped us because the staff are aware of what services we offer."

4.7.7.2 Unavailability of Reading Materials

TARDA interviewee expressed concern on how their reading materials are not available to the users, saying:

> "We will continue having unsatisfied users because of the budget constraints experienced in our library."

Information centres seemed to have a deficiency of reading materials caused mainly by the slow process of acquisition. Unavailability of these materials goes hand in hand with inadequacy of materials. In addition to this, the special libraries tend to lend materials for prolonged period to many users who often make special requests. That way, the materials become unavailable to other users for a long period of time.

4.7.7.3 Inconvenient access to Information Centres

Most information centres' locations are inconvenient. Some are based in the CBD where users are hindered by factors like car parking charges, security, and traffic jam. Others are remotely located in for instance, Industrial Area, Nairobi. Training School library expressed this challenge through their response during the interview:

> "The great challenge we have as a library is our location in Ruaraka. Apart from the students in the school we have other users who work in Kenya Power in different parts of the country. We use an administration mail service to dispatch the books they request. This takes 2 to 3 days for those in remote areas."

Other libraries are based in the headquarters of the parastatals in locations that are inconvenient to users coming from other regions of the country.

4.7.7.4 Low compliance to Collection Development Policies

Information resources at the moment cannot meet the needs of a larger user base within ESI sub-sector. The collection development policies and acquisition policies are not fully implemented to ensure that the relevant materials are obtained and disseminated to relevant users. For instance, all reports on projects are not necessarily available in these information centres, yet the collection development policies clearly stipulate the kind of materials the information centres should acquire.

4.7.7.5 Traditional Culture of Information Hoarding

Several staff members within the ESI sub sector have a tendency of withholding individual information within their departments, sections or offices, yet this information could be useful to staff members in the same department, staff members in other departments as well as other ESI sub sector players. Withholding information denies users the accessibility.

4.7.7.6 Invisible Barriers

The information centres complained of existing, invisible barriers; for instance, security, politics and organizations regulations'. These barriers tend to work against accessing information centres in other parastatals. For instance, from the response from the interview with Records Centre informant, the Official Secrets Act that provides preservation of state secrets and security is a barrier in some instances when it is invoked to protect certain kinds of information in public offices and state corporations that could be of use when accessed. Organizations' regulations could also be relaxed to make accessible any information that could be of use in decision making by players in ESI.

4.7.7.7 Low priority in Funding Information Centres

Funds allocated to information centres are often less than funds allocated to other departments. Departments that are deemed to be direct revenue generators often take the lion's share. The management has a tendency of quantifying the services provided by each department and, quantifying the benefits of information centre services can be an uphill task.

4.7.7.8 Low Priority in Networking and Sharing Information

A common sentiment from Training School, TARDA, GDC and ERC stated that Information centres have a tendency to place a low priority on information resource sharing activity. This is because they have informal information resource sharing activities which seems to be adequate. Some centres KenGen mentioned that they have already considered installing this program but often find themselves contending with hurdles of slow development of policies from the management of the parent organization.

4.7.2 Challenges Faced by Users of Information Centres

The information in this section was obtained from responses of questions from the questionnaire distributed to registered users. The respondents were asked to indicate challenges they face when using their information centres.

4.7.2.1 Lack of Awareness of Services, Links and Low Quality Websites

Most of the respondents from TARDA, GDC, Training School felt that there are no physical or website links that they know of between information centres of parastatals in ESI. They commented on poor marketing and publicity strategies, if any, that their information centres employed, resulting in users being unaware of services provided. For instance, they did not know of interlibrary loan services available for their use. In addition, they also reported that some websites are sometimes not available on the Internet at the time of searching. For the websites that are available, respondents stated that the style of presentation was unattractive and had insufficient information.

4.7.7.2 Unawareness of Benefits of Information Services

In KPLC's Training School and Records Centre, and TARDA library, the benefits of information services are not widely known to the staff members due to poor publicity strategies. This means that they may have registered with these centres and stayed inactive for a long period of time because the use of these information centres is low in their priority of activities. When in need of information, the users therefore go for alternative sources of information.

4.7.7.3 Constraints in Accessing Information across Players

Many respondents from all information centres expressed their frustration of having struggled with the inconveniences of accessing information centres. Respondents

from KPLC, KenGen, TARDA and GDC stated that they are stationed in remote locations relative to the information centres, thus being hindered by distance from using them. Many of these users struggle to access information from other information centres within the ESI sub-sector. Some complained about the bureaucracy involved. Some had no idea where to begin the search or who to contact, and thus they ended up spending a lot of time before they could obtain the information, as a result of which they gave up. The study confirmed that there was no formal information resource sharing program, or information resource sharing agreements known to the respondents. The few informal information resource sharing activities existing were hardly known to the users.

4.7.7.4 Limited Information Resources

By the time of this study, the information centres in ESI sub-sector seemed to operate in silos. According to the respondents, collaboration and networking among them did not appear to be a priority, which resulted in data inconsistencies and limited information coordination between the institutions. With this kind of architecture, individual information centres have limited reading materials and limited resources allocated for their management. Some users mentioned that there are some information centres that deliberately refuse to share information.

4.7.7.5 Discriminatory Information Services

Some information centres do not serve all users equally as revealed by some respondents. They indicated that some users are given more preferences than others. This affects the users satisfaction of services received, hence affecting the general quality of information services.

4.8 Suggested Strategies for Improvement

The sixth objective of the study was achieved by obtaining strategies for improvement of information resource sharing activities in ESI sub-sector information centres. This data, gathered from both the staff members and users of the information centres formed the basis of developing a framework for information resource sharing in information centres of ESI.

4.8.1 Improve Communication Links in Information Centres of ESI

The respondents had a common desire that information centres improve communication channels among them. It was suggested that all websites of the information centres be linked together or probably just share a common website platform. There is need to develop a common and secure information sharing infrastructure using ICT technologies. This setup would lead to the scenario of a one-stop shop used by all players in the ESI sub-sector, thus improving the accessibility of materials within the sector, irrespective of the ESI player in which the user is based. This will also result in the reduction of time taken to access information and improve on information and knowledge exchange among the users.

4.8.2 Upload and Update Relevant Content onto the ESI Websites

The information centres in the ESI should take advantage of existing ICT infrastructure and establish well designed, comprehensive and relevant websites to suit the needs of their users. This can be achieved by uploading relevant content, regularly updating information on the websites, having attractive user friendly websites and linking all the websites in this sector. This would create online interactions by users and staff of the information centres in the ESI sub-sector. The

respondents who complained about the inconvenience of the location of the information centre would also benefit from this online interaction.

4.8.3 Improve on Marketing and Publicity Strategies

The information centre staff members should improve on their marketing and publicity initiatives. All the information centres should create awareness to their users, providing information on the available materials and services provided, including interlibrary loaning services, information on how the services can be accessed and information on new materials received. The information centres should also aim at using effective methods of communication to advertise their services. Marketing the information services can be effective using the company intranet, email communication, notice boards, awareness and orientation programs, flyers, brochures and library magazines.

4.8.4 Develop user Training Programs

The information centres should not assume that users are able to search for information effectively using both online and print bibliographic tools. There is a need to develop training programs to improve users' information seeking skills and empower them to use both the physical and virtual libraries within the shortest time possible.

4.8.5 Manage Existing Bureaucracy

Bureaucracy exists to ensure that information is not disseminated to the wrong recipients and to ensure that right information is available for use. However, the numerous steps that are to be followed in parastatals and government departments often have the effect of derailing the processes of information dissemination and use. Information centres could address this challenge by creating and implementing

information resource sharing policies and identifying contact persons in other players in the ESI sub-sector who appreciate information accessibility and sharing in the sector.

4.8.6 Develop a Common Collection Development Policy for ESI Information Centres

Each information centre must strategically plan to improve and increase relevant materials that meet the primary needs of their users, and which could also supplement those of the ESI sub-sector. A justification of this action could be shared with the management to enlist their support. While this effort is going on, it is inevitable for the information centres to have a consolidated plan of developing a common collection development policy that could serve the entire sub-sector. An open discussion on how to improve their services in the industry is equally important.

4.8.7 Manage Networks and Collaborations of Information Centres

Each player in ESI could benefit from information generated both within and from other ESI players. Thus, the players could develop inter-firm alliances or corporate agreements between two independent players. This is initiated by having open discussions and initial meetings on the subject matter of information resource sharing. These discussions should address development of a formal information resource sharing program, develop polices related to information resource sharing in the ESI sub-sector, and come up with mutual agreements or memorandum of understanding (MOU) that would create a formal interactive environment of information and knowledge exchange. There has been a suggestion that a final proposal incorporating the above-mentioned views be presented to the Chief Executive Officers to enable them understand, own and drive the agreements to their implementation stages.

4.8.8 Develop Policies and a Framework on Information Resource Sharing

The information centres could embark on designing policies that would facilitate information sharing among the players in the sub-sector. These policies can be designed by the information centre staff with the guidance of management. Factors to consider during this exercise include levels of permission to access different types of information resources available in the information centres. A framework on information resource sharing was then developed using the suggestions for improvement highlighted in this chapter.

4.9 Chapter Summary

This chapter discussed the data collected, it reported and analyzed its findings using figures and tables, percentages, frequencies and other statistical methods, and using narration. The quantitative and qualitative analysis was done separately and a merging of interpretation and conclusion became evident. The chapter highlighted the availability of information resources and services, and emphasized the importance of information resource sharing services among ESI players. It also confirmed the extent to which ICT is used in resource sharing activities. Based on the findings, it set forth challenges faced in providing the services and suggested strategies for improvement which then led to the development of a framework for information resource sharing in the information centres of ESI.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONAND RECOMMENDATIONS

5.1 Introduction

This chapter is a summary of the findings of the research and recommendations, highlighting the strategies necessary for the development of a framework of a formal information resource sharing program in information centres of ESI. It also seeks to bring out a clear picture of the status of information resource sharing in this sector, the conclusion of the study, recommendations and suggestions for further research.

The aim of this research was to investigate information resource sharing activities in ESI, identify strengths, challenges and suggest strategies for improvement to develop a framework in information resource sharing. The specific objectives of the study then generated research questions that were to be used to guide the researcher. By the end of the research each objective had been met using the guidance of the six research questions and their responses. These research questions were:

i. What kind of information resources and services exist in the information centres in ESI?
ii. How are the information resources and services used and accessed?
iii. To what extent are the information resource sharing platforms and strategies used in the information centres in ESI?
iv. To what extent has the existing information resource sharing activity adopted the use of ICT in the information centres in the ESI sub-sector?
v. What challenges and limitations do the ESI sub-sector information centres face in information resource sharing activities?

vi. What strategies can be suggested in the improvement of information resource sharing that will guide in developing a framework in information resource sharing in information centres in ESI?

5.2 Summary of Findings based on Research Questions

The responses to these research questions constituted the basis of the findings as summarized subsequently.

5.2.1 What kind of Information Resources and Services Exist in the Information Centres in ESI Sub-Sector?

From the findings of the study, a variety of information resources and services exist and, depending on the type of library, the different types were used as reflected in the findings. The information resources used are those mainly related to ICT, business and management, environment, energy generation, energy transmission, energy generation and inspirational texts. The formats existing include books, serials, AV materials, government publications, reports, records, standards, company documents, photographs, archival materials, projects, manuals and drawings. The findings revealed that of the collection of information materials in KPLC Training School Library, majority were books. The subject area is defined by the courses offered which are technical in nature. The collections in information centres of ESI sub-sector players like GDC, KenGen and ERC were mainly government documents, company documents and reports. KenGen and KPLC libraries were known to subscribe to electronic commercial libraries.

Information services are provided using CAS, SDI, OPAC, company intranets, inter-library loans, reference services, circulation services and reading services. The users' satisfaction rating for the information services was 70% overall. From the findings, informal inter-library loans and other informal information sharing services exist but are limited in their services due to lack of policies and mutual agreements among the information centres. The findings indicate that a large percentage of users are not aware of any resource sharing services in their information centres.

This research has revealed the number of similar resources held by individual information centres, in form and in subject matter. A consortium of such centres can benefit the ESI sub-sector by using minimal resources to provide numerous resources to their users. Intra-Type RS model of Figure 3information resource sharing can easily be adopted by sharing required resources to achieve effective information services.

5.2.2 How are the Information Resources accessed and used?

The findings reveal the different methods users employ to access information in the information centres. The highest number of respondents preferred to make a physical visit to the information centres. This means that if the facility's physical location is defined and marketed to users in the ESI sub-sector, it would be more attractive and useful to them. It is necessary to make use of the ICT infrastructure to avail information resources to the users, given that a high percentage of users preferred to use ICT methods in searching for information.ESI can adopt the secure layered model for digital libraries interaction in accordance with the existing access policies in cases where information centres have digital materials.

5.2.3 What forms of Information Resource Sharing Activities Exist in ESI and how Adequate are they?

From the findings, information resource sharing initiatives are all informal. There are no policies and formal programs on information resource sharing existing in any of the information centres of ESI. This is influenced by the level of willingness of the information centre to share information with other information centres in the ESI sub-sector. No policies regarding information resource sharing exist within this sub-sector. Even with the informal initiatives, users are still not aware of any information resource sharing activities among the information centres in the sub-sector.

5.2.4 To what extent has the Existing Information Resource sharing activity adopted the use of ICT in the Information Centres in the ESI Sub-Sector?

The findings reveal that the informal information resource sharing activities that exist barely embrace the use of ICT technologies to improve their efficiency. The ESI sub-sector players have developed individual websites, for instance; but there has been no effort to share information using this platform. Many of the respondents to this research expressed dissatisfaction, complaining about the system not being user friendly, and also about the many times the websites are inaccessible. It was also indicated that the content of the respective websites was not sufficient to meet the users information needs.

5.2.5 What Challenges and Limitations do the ESI sub-sector Information Centres face in Information Resource Sharing Activities?

ESI information centres experience limitations with regard to inadequate resources arising from the limited budgets allocated to them. Generally, if a parastatal happens to face financial constraints, some of the first departments or sections that

immediately experience budget cuts include libraries and information centres. The academic qualifications of staff members in the information centres are also limiting, considering that there are only two of them who have attained a master's degree, not to mention that neither of the master's degrees obtained is in the field of Information Sciences. The inconvenient locations of some of the information centres are also a hindrance to their prospective users.

5.2.6 What Strategies can be Suggested for improvement that lead to Developing a Framework for Information Resource Sharing Activities in ESI?

Adopting the use of models proposed in this research would greatly enhance the strategies set forth in Chapter Four Clause 4.8that could be used in developing a framework for information resource sharing in ESI information centres. The findings support Sharif's Intra-type Resource Sharing Model which defends the view of information centres forming partnerships with each other to extend users' access to information sources. The study has also been informed by the Secure Layered Model for Digital Libraries Interaction shown in Figure 1. The findings hereby reveal that digital libraries are being constructed within the sector. The sharing of their information is therefore guided by the different layers of policy management and authentication shown in Figure 1 to support provision of cost effective information services.

The strategies suggested for improvement, based on the findings of the study, are:

i. **Establishing more information centres**: The ESI players who do not have information resource centres should make creating one a priority. All information centres should ensure that collection is adequate. The researcher perceives this as a vehicle to enhance exchange of information among the

players. A well-equipped information centre has the capability of organizing, preserving and providing retrieval tools for users to access timely information in a convenient manner.

ii. **Automating Information Centres:** Some of the information resource centres in this sector have not been automated. A strategy to automate the entire operations is inevitable in this digital era. Undertaking this project is likely to improve the efficiency and effectiveness of information services provided. It could also help promote information sharing with other centres ESI.

iii. **Digitization of Information Centres:** Each information resource centre should embark on a digitization program that will improve the convenience of access to information in digital formats across the information centres in ESI. With the strategies on automation of operations and digitizing materials in place, a portal should then be developed that facilitates convenient accessible to information via the intranet of each ESI player.

iv. **Enhancing policies on Information Resource Sharing:** Information Centres should seek to formulate new and improve existing policies that have a direct impact on information resource sharing program. The key policies to be considered are collection development policy, individual and corporate membership policy and access control policy.

v. **Developing a framework for information resource sharing:** A framework thus, is developed using the strategies i to iv as the foundation. Having established information centres where they were not existing, automating and existing all the centres and enhancing policies related to information resource sharing, the framework to be developed shall provide clear guidelines on the implementation strategy.

5.3 A Developed Framework for Information Resource Sharing in ESI

The research findings indicated that there has not been any formal program in information sharing in the information centres in ESI. With this awareness, one of the key recommendations is for the heads of information centres to collaborate and discuss on the justification of introducing a formal information resource sharing program for the sector. The heads of information centres should embark on tackling problems that may arise in the event of sharing information with other institutions of ESI, and eventually develop a suitable policy framework on information resource sharing. The study henceforth has used guidelines and principles derived from suggested improvements on information sharing to develop a framework for information sharing program in ESI. This framework has been developed to guide ESI information centres in operating efficient information sharing programs

THE FRAMEWORK

The Framework outlines a vision and mission of information resource sharing in ESI. It also links its vision and mission to the business strategy of ESI. The framework lists guidelines that shall be used when implementing the Information Resource Sharing Program in ESI. The guidelines:

- Provide definitions of key terms, concepts and principles of information resource sharing which will be applicable to the proposed information resource sharing program.
- Highlight the circulation policies and guidelines existing in each information centre so that each player is made aware of what they can access from other information centres.
- List steps in managing and maintaining databases that contain details of participating information centres in the proposed ESI information resource

sharing programs. The details should include the interests of the institutions and the information they are ready to share with other players. This database should be stored and maintained by one of the players who is carefully and unanimously selected by the ESI players.

- Give direction to participating information centres on alternative locations of information of their interest.
- Provide sets of instructions on individual website designs that apply standards on the structure and content design on the web which in turn should facilitate collaborations when sharing information online.
- Provide details of ICT infrastructure to be acquired and used in each information centre to facilitate a successful information sharing program. The standards of interoperability of these systems should be clearly defined to ensure smooth execution of the program.
- Provide standards on establishing institutional repositories and ensuring each institution develops digital rights management to provide guidance on information exchange among the ESI players
- Draw the information resource sharing programs from information resource sharing policies developed and define specific roles for specific tasks.
- State agreed levels of permission to access types of information resources for accessibility by the information centres.

The framework shall be revised when need arises and when the corresponding policies on information resource sharing are reviewed. The study proposes that this framework be treated as an official document and circulated to the Executive Management and Managers of all Information Centres in ESI for its effective application and use.

5.4 Conclusion

This study set out to investigate information resource sharing activities in ESI. The specific objectives of the study were to examine information resources and services available, to establish the access and use of information resources and services in ESI sub-sector; to determine the forms and adequacy of information resource sharing activities, to determine the extent of the use of ICT technologies in resource sharing activities, to identify the challenges experienced by ESI sub-sector players in information resource sharing activities, and to develop strategies for the improvement that lead to developing a framework for information resource sharing in information centres in ESI. The study was based on the assumption that the lack of a formal information resource sharing program negatively affected the information services provided, affecting the services of ESI related organizations to the their customers. It was informed by Intra-type Resource Sharing Model and Secure Layered Model for Digital Libraries Interaction. The study revealed that there is availability of varied information resources and services, and that access to and use of information resources is not as extensive as it should be. It also revealed a lack of a formal program on information resource sharing and the inadequacy of informal resource sharing activities. It also showed that ICT use in information resource sharing is limited and identified the challenges of inadequate resources, users' unawareness of services available and limited networking among information centres. In conclusion, lack of a formal information resource sharing program in ESI negatively affects information services. Thus, a framework in information resource sharing which provides the structure and guidelines in establishing information resource sharing program in ESI has been developed and proposed for adoption in ESI. This is

expected to impact positively on information services, thus improving the quality of services and products in ESI.

5.5 Recommendations

These recommendations are derived from the respondents of this study based on the findings showed earlier in Chapter Four and are derived from the recommended strategies for improvement.

5.5.1 Establish more information Centres

5.5.1.1 Establishing Information Centres and Managing Collaborations

Each player in the ESI sub-sector could benefit from information generated, both within and from other ESI players. That way, the players could develop inter-firm alliances or corporate agreements between two independent players. This is possible by first ensuring that information centres are established in players that do not have them. Having open discussions and initial meetings on the subject matter of information resource sharing. These discussions should address the development of a formal information resource sharing program, develop polices related to information resource sharing in the ESI sub-sector, design mutual agreements or memorandum of understanding (MOU) agreements that would create a formal interactive environment of information and knowledge exchange. A suggestion floated is that a final proposal with the above mentioned considerations could be presented to the chief executive officers to help them understand, own and drive the necessary agreements to their implementation stages.

5.5.1.2 Improve on Marketing and Publicity Strategies

The information centre should improve on their marketing and publicity initiatives. It is not obvious that the services these information centres provide are automatically attractive to the individual staff members in ESI. From the findings of the study, some of the information centres in ESI were not receiving adequate funding from their parent organizations. Marketing has a direct implication on the decision regarding funding the centres. The study deduced that the information centers should develop a marketing plan as part of their entire planning process which allows for planned rather than disorganized approach to the marketing strategy. The marketing plan would help each information centre obtain relevant information regarding their services, strengths and opportunities, potential risks and marketing objectives, and market strategies. This plan should reflect the changing aspect of information design of products and services which are attractive to different target groups of users. It should also lead to the development of marketing strategies that would distinctively identify the specific services, for instance, e-resources, circulation services, reference services and information resource sharing services that they may need to clearly match the needs of the users and adjust them appropriately. The information centers would thus deliver a more dynamic and responsive service their users.

5.5.2 Automation and Digitization of Existing Centres

5.5.2.1 Improve Communication Links using ICT in Information Centres of ESI

The respondents shared the common opinion that information centres should improve communication channels among themselves. The extensive use of ICT in resource sharing is likely to transform information centres, with users served faster than when using traditional approach of information resource sharing. This would also help facilitate the desired collaboration among information centres in ESI. It was suggested

that all websites of the information centres be linked together or consider sharing a common website platform. There is need to develop a common and secure information sharing infrastructure, especially because of its cost possible effectiveness and service efficiency. This setup would lead to a one-stop shop for all players in ESI, hence improving the accessibility of materials within the sector irrespective of the player a user is based. It will also result in the reduction of time taken during information searches and improve on information and knowledge exchange among the library users. Considering the economic aspect, ICT is capable of conveniently accommodating volumes of information stored in information centres, thus reducing costs of storage as well as the cost of accessing that information.

5.5.2.2 Upload and Update Relevant Content onto the ESI Websites

Library resources are still of higher quality than information tools available on the web; however, libraries could play a key role in enhancing their own websites to suite their patrons' information needs as well as introduce an environment that provides access to freely available information on the web. Hence, information centres of ESI should establish well designed, comprehensive and relevant websites. This can be achieved by uploading relevant content, regularly updating information on the websites, having attractive user friendly websites and linking all the websites in this sector together, forming a single ESI web portal. It would create online interactions by users and staff of the information centres in the ESI sub-sector. This portal could improve their quality by using social media platform to measure the success of their content using users' perspectives. For instance, Facebook can provide developers and site owners with metrics about their content. If the proposed ESI portal uses this feature, it could track consumption and creation of information and analyze the trends so that it is better equipped to improve the functionalities of the website and

information sharing activities. The respondents who were hindered by the inconvenient location of the information centre would also benefit from this online interaction, as it would counter the limitations of physical accessibility.

5.5.3 Enhancing Policies Related to Information Resource Sharing

5.5.3.1 Develop a Common Collection Development Policy

Each information centre should strategically plan to improve and increase relevant materials that meet the primary needs of their users, and which could also supplement the needs of those of the other users in the ESI sub-sector. This importance of doing this could be shared with management to enlist their support. While this effort is going on, the information centres should seek to have a consolidated plan on developing a common collection development policy that would serve the entire sub-sector. The centres should come up with a collection development policy with common objectives, shared by all players. These objectives should result in wide and complementary collections that are capable of meeting the objectives of information centres in ESI. The collection development policy should guide the collaborative selection and process that would ensure timely acquisition of sufficient materials for all the participating information centres. An open discussion on how to improve their services in the industry is equally important.

5.5.3.2 Develop user Training Policies and Programs

A thriving ESI will best be innovative and developed by staff members who are able to recognize their need for information and then proceed to identify, locate, access, evaluate and apply the needed information in their work. The researcher observed that some respondents to the questionnaire were not aware of the information they needed. The information centres should recognize that there is a need for an information

literate workforce in ESI instead of making the assumption that their users are able to search for information effectively. All staff members in ESI should be competent in interacting with information so that they excel in delivering maximum value. There is a need to develop and implement valuable information literacy programs that empower users to search both the physical and virtual libraries within the shortest time possible. The elements of information literacy which provide a foundation in the work environment can regularly be used by the individuals. The heads of information centres should thus establish clear policies on information literacy and work together as a community to engage stakeholders in information literacy programs as they promote information resource sharing.

5.5.3.3 Manage Corporate Bureaucracy

Bureaucracy exists to ensure that information is not disseminated to the wrong recipients. The bureaucracy system of administration is commonly used in parastatals and government departments. However, in a corporate setting, it can easily dampen innovation and slow down creation of new ideas and the processes in the information centres. Information services provided within ESI are usually adversely affected by the requirement to comply with bureaucracy. Nevertheless, information centres could alleviate this challenge by identifying contact persons in other players in the ESI sub-sector who are aware of their objectives and interests. They should also obtain clear information and understand on existing procedures in the company so that all their requirements are included in their annual strategic plans on time.

5.5.4 Use of the Developed Framework for Information Resource Sharing

The Framework for Information Resource Sharing that has been developed as a result of this study should thus be used by the information centres of ESI. It is recommended

that the framework be used as an official implementation tool for establishing information resource sharing programs, after having been approved by the top management of each ESI players. This framework shall act as a guide as the heads of the information centres of ESI embark on establishing a formal program of information Resource Sharing in the sector.

5.6 Suggestions for Further Research

This research concentrated on developing a framework for information resource sharing, highlighting its challenges and strategies of improvement in the ESI sub-sector. There should be a further study on collaborative information behavior and information-seeking habits of users of information centres in ESI. This could focus on how staff members should actively work as a team to identify information needs when developing information-seeking strategies and provide recommendations in complex information problem solving, considering that there are multiple areas of expertise in the ESI sub-sector.

5.7 Chapter Summary

This chapter discussed the summary of findings based on responses to the research questions, it described the framework on information sharing program for ESI which was developed based on the recommendations suggested. A Conclusion in this chapter highlighted the two models that were used to guide the research from when the research problem was identified and conducting to the point when a framework on resource sharing in ESI was developed. Recommendations of the study were listed and suggestions for further research were finally made.

REFERENCES

Bhoopalam, K., Maly, K., Mukkamala, R. and Zubair, M. (2007). Framework for information sharing across multiple government agencies under dynamic access policies. *Computer Society, IEEE*, 934-940. doi: 10.1109/ARES.2007.92.

Bryman, A. and Bell, E. (2003). *Business research methods*. Oxford: Oxford University Press.

Bytheway, A. (2014). *Investing in information: The Information Management Body of Knowledge*. Switzerland*:* Springer International Publishing. doi: 10.1007/978-3-319-11909-0_1.

Cresswell, J.W. (2003). *Research Design: qualitative, quantitative and mixed method approaches* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Cresswell, J.W. (2007). *Quantitative inquiry and research design: choosing among five approaches*. (2nd ed.). Thousand Oaks, CA: Sage Publications.

The Departmental Committee on Energy (2010). *Report on ownership and status of the Kenya Power and Lighting Company Ltd. (KPLC)*. Nairobi: The Kenya National Assembly.

Cresswell, J.W. and Plano Clark, W.L. (2011). *Designing and conducting mixed methods research.* (2nd ed). Los Angeles: Sage Publications, Inc.

DAC and NCLIS (2009). *The Library and Information Services (LIS) transformation charter*. 6th Draft. DAC and NCLIS.

Denzin, N.K. & Lincoln, Y. (2000).Introduction: The discipline and practice of qualitative research. In N.K. Denzin& Y. Lincoln (Eds.), *Handbook of qualitative research* (2nd ed), (pp.1-17).Thousand Oaks, CA: Sage Publications, Inc.

Elo, S. & Kyngäs, H. (2008) The Qualitative content analysis process. *Journal of Advanced Nursing62*(1), 107–115.

The Energy Act (2006). Nairobi: Government of Kenya

ERC (2012). *Electricity supply industry in Kenya*. Retrieved from http://www.erc.go.ke/index.php?option=com_content&view=article&id=107&Itemid=625

Flick, U. (2002). *An Introduction to qualitative research*(2nd ed.). London: Sage Publications.

Geronimo, V.A. and Aragon, C. (2005). Resource sharing in university libraries: a tool for information interchange. *Library Collections, Acquisitions & Technical Services, 29*, 425-432.

Hansen, P. and Jarvelin, K. (2005). Collaborative information retrieval in an information-intensive domain. *Information Processing and Management, 41*, 1101–1119.

Kaul, S. (2001). Information Resource sharing models in developing countries: a network emerging from the World Bank supported environmental management capacity building project. *Inspel*, *35*(1),9-26.

KenGen (2012). *About us.* Retrieved from http://www.kengen.co.ke/?q=about-us/who-we-are

Kenya Power (2012). *Corporate Profile*. Retrieved from:http://www.kplc.co.ke/content/item/1484/corporate-profile

Kenya Power (2015). *Annual reports and financial statements: financial year ended 30 June 2015*. Nairobi: Kenya Power.

Krishnappa, R. (2005). Multi-user search engine (muse): Supporting collaborative information seeking and retrieval. *Master's Thesis*, University of Missouri - Rolla, Rolla.

Lapan, S. D., Quartaroli, M.T. and Riemer, F.J. (eds.) (2012). *Qualitative research: an introduction to methods and designs*, Jossey-Bass.

Leigh, R. (2012). *Types of information resources a business needs.* Retrieved fromhttp://smallbusiness.chron.com/types-information-resources-business-needs-4586.html

Mannan, S.M. and Bose, M. L. (1998). Resource sharing and information networking of libraries in Bangladesh: a study on user satisfaction. *Malaysian Journal of Library and Information Science,2*, 67 – 86.

Ministry of Energy (2012). *The National Energy Policy: third draft*. Nairobi: Ministry of Energy, GoK.

Mishra, R.K. (2000). Resource sharing: the third dimension of library automation. *Caliber-2000*, 16-18 February 2000.

Nayar, M. (2007). The Obsolete notion of auditing information. *Directors & Boards*, *32*(1).Retrieved fromhttp://vlex.com/vid/obsolete-notion-antiquated-cavalry-56957446.

Nzibande, S. and Stilwell, Christine (2008). Sharing Information Resources: a study of school clusters from rural KwaZulu-Natal, South Africa. *Libri*, *58*, 234-245.

Okeagu, G. and Okeagu, Blessing (2008). Networking and resource sharing in library and information services: the case for consortium building. *Information Society and Justice, 1*(2), 255-262.

Omar, R., Ramayah, T., Lo, Sang, T.Y. and Siron, R. (2010). Information Sharing, information quality and usage of information technology (IT) tools in Malaysian Organizations. *African Journal of Business Management,4*(12), 2486-2499.

Posner, B. (2007). Library Resource Sharing in the Early Ages of Google. *Library Philosophy and Practice*, June 2007. Retrieved fromhttp://www.webpages.uidaho.edu/~mbolin/posner.htm.

Reddy, M.C. and Jansen, B.J. (2008). A model for understanding collaborative information behavior in context: a study of two healthcare teams. *Information Processing Management*, *44*(1),256-273. doi:10.1016/j.ipm.2006.12.010

The Research Advicers (2006). *Sample size table.* Retrieved from http://research-advisors.com/tools/SampleSize.htm

Satija, M.P. (2009). Consortia and Cooperative Collection Development in the Libraries of Technological Institutes of North India. *Library Philosophy and Practice*Retrieved fromhttp://www.webpages.uidaho.edu/~mbolin/satija-kaur.htm

Saunders, M., Lewis, P. and Thronhill, A. (ed) (2003). *Research methods for business students*. (3rd ed.). England: Prentice Hall.

Sharif, M.A. (2006). *Library Co-operation through resource sharing (RS): Models for Lahore Libraries*. Retrieved from http://aku.academia.edu/AshrafSharif/Papers/575635/Library_Co-operation_Through_Resource_Sharing_RS_Models_for_Lahore_Libraries

Siddike, A.K. (2010). *Use of Information and Communication Technology (ICT) for automated networking and resource sharing in the selected public and private university libraries in Bangladesh*: Thesis: University of Dhaka, Department of Information Science and Library Management.Retrieved fromhttp://eprints.rclis.org/15832/1/Full%20Report.pdf

Soete, G.J. (2002). *Planning models for library resource sharing*. Retrieved fromhttp://pnclink.org/annual/Annual1995/pdf/george.pdf

Swanson, R.A. and Holton III, E.F (eds.) (2005). *Research in organizations: foundations and methods of inquiry*. Berrett-Koehler Publishers.

Wilson, T.D. (2010). Information sharing: an exploration of the literature and some propositions, *Information Research*, **15**(4), paper 440. Retrieved fromhttp://informationr.net/ir/15-4/paper440.html

Xin-li, Z., Chao, Z. and Wei-wei, Ren (2006). Information resource and knowledge production. *Conference Management Science and Engineering*, 157-165.

APPENDICES

APPENDIX 1: LETTER TO REQUEST FOR RESEARCH DATA

From: Mildred Odongo

September 2013

To: Respondent

RE: REQUEST FOR RESEARCH DATA

I am a post graduate student currently undertaking a Master of Science Degree in Information Sciences at Moi University, Nairobi Campus. As a requirement in partial fulfillment of the degrees program, I am conducting a research study on 'Developing a framework for Information Resource Sharing in Information Centres in Electric Power Sub-Sector in Kenya.'

The purpose of this letter is to kindly request, for information which will facilitate the completion of my project. In this regard, kindly complete the attached questionnaire which will take you approximately twenty minutes.

The responses and findings will be used for academic purposes only and will be received in confidence. Your responses will not be individually analyzed but grouped together to draw a general conclusion on the effectiveness of formalizing information resource sharing in the Information Centres of Electric Power Sub-Sector. Thank you in advance and look forward to working with you.

Mildred Odongo
MPHIL, Information Sciences Student

APPENDIX 2: INTERVIEW SCHEDULE

Developing a framework for Information Resource Sharing in Information Centres in ESI Sub-Sector

I am a post graduate student currently undertaking a Master of Science degree in Information Sciences at Moi University, Nairobi Campus. As a requirement, in partial fulfillment of this degrees program, I am conducting a research study on 'Developing a framework for Information Resource Sharing in Information Centres in Electric Power Sub-Sector in Kenya.'

Aim

The aim of the study is to obtain information on the kind of services and resources provided by the information centres in ESI sub-sector, the extent to which information resource sharing has been adopted and challenges faced in providing such services. All the responses will be taken in confidence. Your responses will not be individually analyzed but grouped together to draw a general conclusion on the study.

Duration

I humbly request for thirty minutes of your time to conduct this interview with you.

Demographic Data

Name of Organization: _____

Department/Section:_____

Age of Information Centre: _____

Size of Collection:_____

Information resources and services

1. What type of information services exists in your organization, a library, a record centre, communications centre, etc.?

   _____

2. What policies guide the kinds of materials stocked in your information centre?

   _____

   _____

3. List policies guiding the information centre's operations and use of materials.

   _____

   _____

   _____

   _____

4. Describe their adequacy and relevance in meeting your users' needs?

_____

_____

5. Is the budget allocated enough to obtain adequate materials required by your users? _____ Yes _____ No _____ Not Sure

6. Are the services administered by qualified personnel?___ Yes___ No ___ Partly

7. Do your users request for information which is not available in your center but can be accessed from other ESI sub-sector players?____ Yes____ No ____ Not Sure

If yes, give examples of the types of information.

_____

_____

_____

Methods of disseminating information to users

8. How accessible is information in your centre to the user? _____

_____

Do you have an integrated system that includes OPAC, or one which is accessible Intranet, and how active is it?_____

_____

9. What methods do you use to disseminate information, and which ones are more

effective?_____

_____

_____

Information resource sharing services

10. Do you have inter-library loan services?___ Yes ___ No

11. If no, give reasons why. _____

_____

_If yes, are there policy guidelines on inter-library loaning?___ Yes___ No

12. Have you established formal information sharing activities?___Yes____ No

13. If an informal information sharing program exists, describe how it works.

_____

_____

14. Are the users aware of any information sharing services which exist?

_____

Which are the participating information centres, and are there ESI information centres among them? _____

_____

What infrastructure and methods are used to ensure information resource sharing is achieved?_____

_____

What materials are usually used during information sharing?_____

_____

How adequate and effective is this service in meeting the users' needs?

a. Adequacy of service meeting the needs of the users _____

_____

Effectiveness of the service to the users _____

Challenges and Strategies for improvement

15. What challenges do you face when accessing information for your users?_____

16. What constraints are you experiencing when performing information sharing activities?_____

_____

17. What strategies can you suggest to improve the information resource sharing activity?_____

_____

18. If information resource sharing does not exist in your case, give reasons, if any, for not having this service active. _____

_____

19. Give reasons why it would be necessary to introduce a formal information resource sharing program in your information centre. _____

_____

If resource sharing was introduced, how would it affect information services in your information centre? _____

_____

I wish to thank you for taking time to respond to my questions

APPENDIX 3: RESEARCH QUESTIONNAIRE

Kindly fill in the questionnaire regarding your information centres and their collaboration with those of other ESI (Kenya Electricity Supply Industry) Sub-sector players. It will take approximately 20 minutes to complete it.

A. Demography

1. Indicate your department, employment terms, job level and gender.

Name of Company	
Department:	
Job Level (Union, Management, etc):	
Gender (Male/Female):	

2. Do you use the company's library/information centre? Yes□ No□

   If your answer in No 2 above is **Yes,** proceed on to fill the rest of the questionnaire.

   If you have answered **No**, give your reasons below and answer questions from No. 11 to the end._____

   _____

Information Services and facilities

3. Describe your satisfaction with the information service facilities

   _____

   _____

4. Rate the facilities of the Kenya Power library you are familiar with by ticking the appropriate box.

	Poor	*Fair*	*Good*	*Very Good*	*Excellent*
Convenience of its location	□	□	□	□	□
Rate its environment	□	□	□	□	□
Reprographic services, e.g. photocopy, scanning, printing services	□	□	□	□	□
Sufficiency of hours of operation	□	□	□	□	□

Audio-Visual Equipment e.g. TV, DVD	☐	☐	☐	☐	☐
Rate the professionalism of staff	☐	☐	☐	☐	☐
Internet accessibility	☐	☐	☐	☐	☐

5. How relevant and adequate are library materials? Tick the appropriate box?

	Poor	*Fair*	*Good*	*Very Good*	*Excellent*
Library materials	☐	☐	☐	☐	☐

Give details of relevance and adequacy: _____

_____

6. How good are the following library services?

	Poor	*Fair*	*Good*	*Very Good*	*Excellent*
Response rate and accuracy of responses to inquiries	☐	☐	☐	☐	☐
Awareness of new materials & library services	☐	☐	☐	☐	☐
Awareness of a Library Automated System	☐	☐	☐	☐	☐
Accessibility & organization of library materials	☐	☐	☐	☐	☐
Adequacy of communication to company staff	☐	☐	☐	☐	☐

B. How Information and Services are accessed and used

7. Give a description of what methods you use to access the library facilities

_____

_____

Give a description of how you use the library facilities_____

_____

Information Resource Sharing and ICT

8. Are you aware of any inter-library (borrowing materials from libraries) activities with parastatals in the ESI sub-sector? Yes□ No□
9. If your answer is yes, answer the following. If your answer is no, then go to question **10.**

a. What interlibrary activities are you aware of?					
b. Have you used these services before?	Yes ☐No☐				
c. If yes, rate the services by ticking on the relevant box	☐ Poor	☐ Fair	☐ Good	☐ Very good	☐ Excellent
d. If no, give reasons why					

10. Do you at times need information not available in your parastatal but is available in other parastatals in the ESI sub-sector? Yes □No□ I don't know□
11. Have you accessed information from other ESI sub-sectors using other means apart from inter-library services in your information centres? Yes □No□
12. If yes, state them and include the time taken where necessary, to access the information.
    a._Time taken _____
    b._Time taken _____
    c._Time taken _____
    d.Time taken _____
    e._Time taken _____
13. If **No**, tick in the box(es) any of the scenarios which could have applied to you.

a.	I tried to search for information from other parastatals in ESI sub-sector and did not get what I was looking for	☐
b.	I needed information but did know how to go about getting it	☐

c.	I needed some information but was uncertain that I would be helped	☐
d.	I needed some information but was too scared to ask	☐
e.	I needed some information but did not know a contact person in the other parastatals in ESI sub-sector	☐
f.	I did not need any information from the other parastatals in ESI sub-sector	☐
g.	Other(specify):	☐

14. Rate the adequacy of information accessible on the following websites by ticking appropriately (NB. If you are not familiar with any of the websites, leave it blank).

	Poor	*Fair*	*Good*	*Very Good*	*Excellent*
Geothermal Development Company (GDC) Website	☐	☐	☐	☐	☐
Kenya Transmission Company (KETRACO) Website	☐	☐	☐	☐	☐
Energy Regulatory Commission (ERC) Website	☐	☐	☐	☐	☐
KenGen Website	☐	☐	☐	☐	☐
Kenya Power Website	☐	☐	☐	☐	☐
Rural Electrification Authority (REA) website	☐	☐	☐	☐	☐
Tana & Athi River Development Authority (TARDA)Website	☐	☐	☐	☐	☐

C. Challenges and suggestions for improvement

15. Indicate any other challenges faced and suggestions you have to improve on the accessibility of information from other parastatals in the ESI sub-sector……

……..……

I wish to thank you for taking time to fill in this questionnaire. Results of the study will be made available at Kenya Power Library

APPENDIX 4: PRE-TESTING CHECKLIST

1.	**The outline and Format**
A.	Introduction to questionnaire
	Title of Study
	Purpose of study
	Duration of time of questionnaire
	Guarantee of confidentiality
	Brief introduction of who you are
	Incentive if any
B.	Demographic Data
	Respondent's demographic details. Respondent's name will be optional
C.	Question format
	Questions are arranged from general to specific
	Clear directions on how to answer are included
	The rating scale must be written before the question
	Response options are placed vertically except for tabulated questions
D.	Conclusion
	A statement of gratitude must be included
	There should be information on knowing the survey results
2.	**The Questions**
	Questions are concise and simple
	Questions should not contain terminologies, acronyms or technical jargons
	The first 5 questions verify the eligibility of the respondent to continue or not
	All questions must point to research objectives. Do the questions: I. Examine information resources and services available in the ESI sub-sector? II. Examine the use and access of information resources and services III. Guide one in determining the forms and adequacy of information resource sharing activities in the ESI sub-sector? IV. Help identify the challenges experienced by ESI sub-sector players in information resource sharing activities?

V. Assist in suggesting strategies for improvement of information resource sharing activities in ESI sub-sector information centres?
All possible response options should be included in each close ended questions
A midpoint response option is included on the rating scale
3.**Pre-Test**
The survey questionnaire was sent to the selected few among the possible respondents (users of the information centres)
A possible respondent of the research interviewed
The researcher received the results, examined and made the necessary corrections

APPENDIX 5: DATA ANALYSIS PROCESS

	Quantitative Procedure	**Qualitative Procedure**
Preparing data for analysis	▪ Data coded by assigning numeric values ▪ The database cleaned ▪ Recorded in MS Excel ▪ A codebook established	▪ Text transcribed ▪ Data prepared for computer analysis
Exploring Data	▪ Data inspected visually ▪ A descriptive analysis conducted ▪ To check for trends and distribution	▪ The data read through ▪ Broader categories of data such as codes and themes formed ▪ A qualitative codebook developed from this
Analysing the data	▪ Analyze to answer research questions ▪ Report inferential tests, effect sizes ▪ Use MS Excel	▪ Using Themes Analysis: Using relational analysis to identify the concepts, meaning units, creation of categories and themes and codes ▪ Assign labels to codes ▪ Group codes into themes ▪ Use software program to analyse
Representing data analysis	▪ Results represented in statements of results using tables and figures e.g. graphs	▪ Findings in discussions of themes or categories ▪ Present visual models, figures and tables
Interpreting Results	▪ Moving from the detailed results to the larger meaning in view of the status and proposed strategies of resource sharing in ESI sub-sector ▪ Compare results with initial research questions ▪ Compare results with prior predictions	▪ Moving from the detailed results to the larger meaning in view of the status and proposed strategies of resource sharing in ESI sub-sector ▪ Check how the research questions were answered by qualitative findings ▪ The researcher draws personal assessment of meanings of findings
Validating data	▪ Validate and check the reliability of scores from the test instrument ▪ Validity of conclusion drawn from results	▪ Building evidence for a code/theme from several individuals ▪ Use reviewer standards

APPENDIX 6: THEMES ANALYSIS CODING AND CATEGORIZING

Categories and themes derived from thematic analysis process

Code	THEMES	CATEGORIES CONTENT
1	Management of information centres	• Libraries, archives and record centres exist • No information centre in Ketraco and REA • Most information centres are newly established • Resources: books, serials, standards, Government Publications, technical drawings, manuals, reports, AV materials, ephemeral records, archival materials, photographs • Qualified personnel provide information services • Adequate budget allocation except in TARDA, Ketraco, REA • Public procurement & disposal act 2006 sometimes delays the use of funds in all information centres • Inadequate library materials • Most players have Intranet except TARDA • Most players have information management system except GDC and TARDA who have plans underway
2	Existing Policies and guidelines	• Collection development, acquisition, Public Procurement and disposal act 2006, QMS Procedures, Processing guidelines, AACR2 standards, DDC, UDC and DRIM classification schemes, disposal and retention schedules, Disposal & Retention Schedule, Official Secrets Act , Books & Newspapers Act, ISO 15489 and AS 4390
3	Information Services	• There is a need to increase the number of materials • Physical accessibility of materials is limited except in ERC with its users operating close to its library and KenGen which has satellite libraries • KenGen and all KPLC libraries have established online facility for online accessibility, use of emails, library brochures and magazines, etc • All libraries use SDI
4	Information Resource sharing services	• No formal inter-library loans facility in place • No policies exist on information resource sharing • No formal programs in information resource sharing

		• Information centres collaborate depending on their cordial relationship • Informal information resource sharing activities exist between KPLC, KenGen, GDC and REA
5	ICT use in resource sharing	• No Intranet and Internet in use in TARDA and GDC
6	Challenges	• Power marketing and publicity strategies of information centres • Inadequacy of required materials and their unavailability • Inconvenient location of information centres • Materials cannot meet the needs of a larger user base within ESI sub-sector • Withholding of individual information within departments or ESI sub sector players • Invisible barriers exist – security, politics, organizational regulations • Financial constraints • Slow development and lack of policies on information resource sharing • Low priority on information resource sharing activities
7	Strategies of improvement	• Improve cooperation among ESI sub-sector players • Establish networks on information centres within the sector • Develop information resource sharing policies at corporate level • Review Acts of parliament that give guidelines to management and sharing information in a large scale • Establish a common portal for ESI sub-sector to access information • Create links within the ESI sub-sector to ease access of electronic information • Build and launch a formal information sharing program
8	Significance of a formal information resource sharing	• Improved convenience of access to information • Increased speed in accessing information • Improved efficiency

	program	• Increased variety, broader access to and forms of information • Increase use of electronic resources • Monitor flow of information and structural support framework of information resource sharing • Constant update of available information • Improved information seeking behaviour among users • Boost confidence as a result of well-informed users • Encourage free communication among ESI sub-sector players • Improved innovations within the sub –sector

APPENDIX 7: PERMIT FROM NATIONAL COMMISSION OF SCIENCE, TECHNOLOGY AND INNOVATION

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THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss/Institution
Mildred Amita Odongo
of (Address) Moi University
P.O.Box 63056-00200, Nairobi.
has been permitted to conduct research in

Nairobi — Location / District / County

On the topic: Developing a framework for Information resources sharing in information Centers in Electric Power Sub-Sector in Kenya.

for a period ending: 31st December, 2013.

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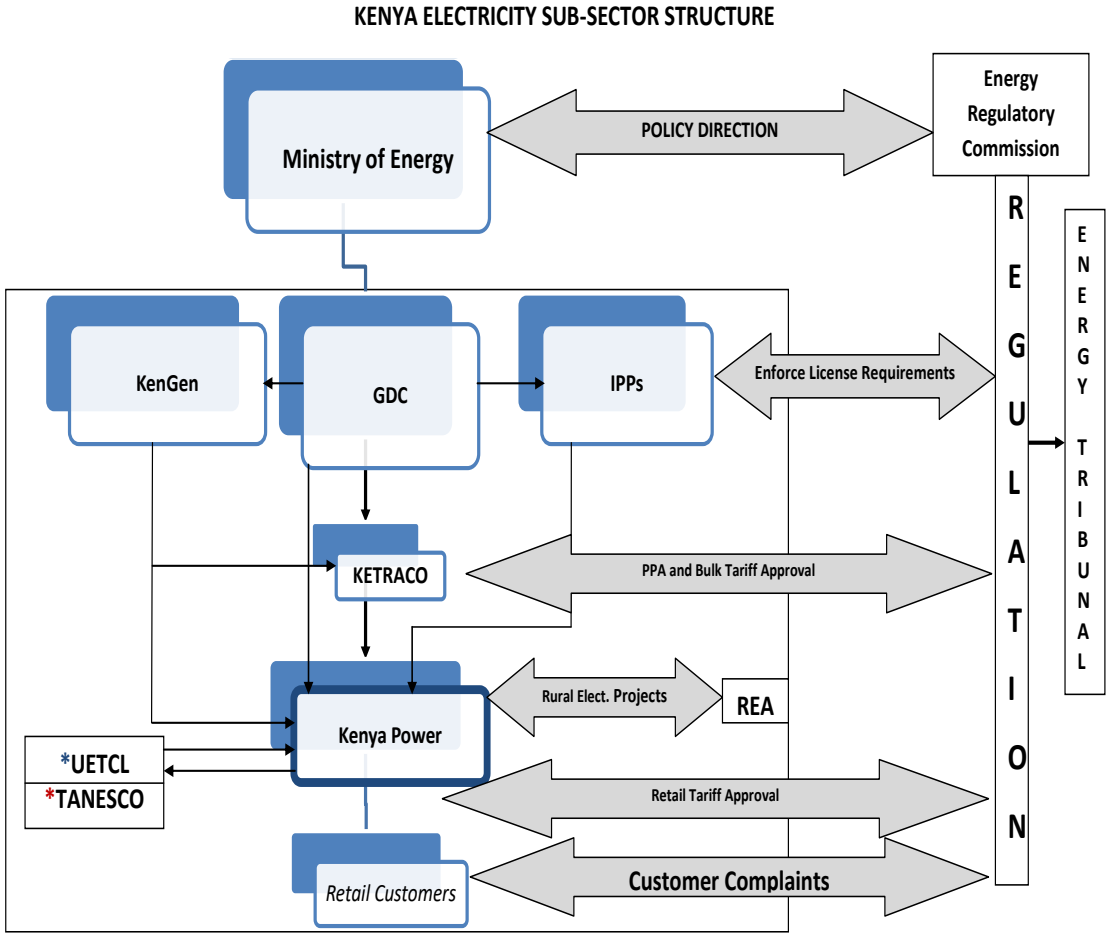
Research Permit No. *NACOSTI/RCD/13/013/111*
Date of issue *19th September, 2013*
Fee received *KSH. 1000*

Applicant's Signature

For: Secretary
National Commission for Science Technology & Innovation

APPENDIX 8: ESI SUB-SECTOR STRUCTURE



*Uganda Electricity Transmission Company

*Tanzania Electric Supply Company Limited