UNIVERSITY OF NAIROBI

SCHOOL OF COMPUTING AND INFORMATICS

A FRAMEWORK FOR KNOWLEDGE MANAGEMENT OF WILDLIFE RESEARCH IN KENYA

BY

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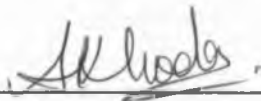
DECLARATION

This project as presented in this report is my original work and has not been presented for any other University award.

Signature: _AKhoda._ Date: March 25, 2011

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This project has been submitted in partial fulfilment of the requirements of the Master of Science in Information Systems of the University of Nairobi with my approval as the University supervisor.

Signature: _____ Date: March 25, 2011

Christopher A. Moturi

DEDICATION

To

The Khoda Family

The Pushkarna Family

For their relentless love and support throughout this journey

May the Almighty always Bless you

ACKNOWLEDGEMENT

ABSTRACT

Kenya boasts a substantial asset in its diverse Wildlife. Extensive research on Wildlife is carried out by various academic and non-academic institutions, both within and outside the Government protected areas. By assessing the key Government agencies that authorize such research, it was revealed that most research findings remain un-reported. New research lacks continuity as there is no documented underpinning available for extension. A framework needed to be developed for the Management of Knowledge in the Kenyan Wildlife Research sector.

Conceptual framework elements were extracted as a result of literature study. These elements were evaluated via data gathered through interviews and questionnaires. Sixty four different protected and non-protected research centres were contacted spanning the entire country. A combination of statistical and thematic analysis was performed on the data gathered.

Conceptual framework elements were confirmed through data analysis. Other elements were revealed as key factors influencing Knowledge Management, specifically in the context of the Kenyan Wildlife sector. Insufficient funds were highlighted as a key constraint of effective Knowledge Management. In-appropriate organizational culture and structure were also pointed as hindrance to Knowledge Management. Lack of trust in the system prohibited successful Knowledge Management.

The additional elements were thus incorporated in the conceptual framework and the validated framework for Knowledge Management of Wildlife Research in Kenya was developed. This framework was suggested to improve collaboration among researchers, thus creating new Knowledge. It is expected to reduce replication of research and induce innovation and learning for future research in the Kenyan Wildlife Research sector.

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ACRONYMS

CTRAD .... Centre for Training and Integrated Research in Arid and Semi Arid Land Development

DATAD............ Database of African Theses and Dissertations Initiative

IT .... Research, Innovation and Technology

KEIN .... Kenya Environmental Information Network

KWS .... Kenya Wildlife Service

MIST .... Management Information SysTem

NADICEST .... NAtional Documentation and Information CEntre for Sciences and Technology

NEST .... National Environment Management Authority

NGO .... Non Governmental Organization

NRF .... National Research Foundation

PICO .... People, Innovation and Change in Organizations

RIT .... Research, Innovation and Technology

UNEP .... United Nations Environment Programme

UWA .... Uganda Wildlife Authority

CHAPTER 1
INTRODUCTION

1.1   Background of Wildlife Research in Kenya

Kenya boasts a substantial asset in its diverse Wildlife. Extensive research on Wildlife is carried out by various academic and non-academic institutions, both within and outside the Government protected areas.

Wildlife is a vital resource for Wildlife scientists, students, managers, applied ecologists, conservation biologists, environmental consultants, industry, NGOs and government policy advisors among others.

The permits and authorization for all research conducted on the Kenyan Wildlife are granted by the National Council for Science and Technology (NCST) and further affirmed by the KWS. It was revealed that the findings of this research largely remained un-reported back to these authorities. Thus this colossal amount of Knowledge gained from the Kenyan ecosystem does not necessarily reach the relevant Kenyan authorities. There lacks a Knowledge Management framework that underpins such management.

1.2   Status of Knowledge Management in Kenyan Wildlife Research Organizations

Wildlife research organizations receive increasing amounts of data every single day. Some of this is processed and stored as relevant, explicit information in document wallets. Other information may be found in staff e-mails, telephone conversations, web conferences and bulletin boards of the organizations. Much of the knowledge though, is found in the form of undocumented tacit knowledge.

This Knowledge resides in the brains of individual staff in terms of their experiences, pitfalls, successes and lessons learnt over the years. When a member of staff leaves the organization, this valuable knowledge, if un-captured, goes with the individual.

The Ministry of Tourism and Wildlife's Draft Policy (2007) states there is inadequate scientific data on Wildlife ecosystems and that the maintenance of Wildlife data sets lack co-ordination.

KWS is a state corporation with the mandate to conserve and manage Wildlife in Kenya, and to enforce related laws and regulations. Wildlife managed by KWS forms the backbone of Kenya's tourism industry, since most visitors come above all, to view Wildlife. KWS, in the review of its Strategic Plan 2005-2010, clearly cites the lack of information sharing among its divisions and regions as one of the big challenges faced by the organization.

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The National Council of Science and Technology is the main statutory body that authorizes and promotes all research in Kenya. There is no water-tight system whereby findings from all current and past research conducted within Kenya are reported back to their offices upon completion. Copies of research findings handed over by a few committed researchers may be found, but it is not a true reflection of all research that is being conducted or has taken place within Kenya.

It would be appropriate to learn from the National Research Foundation (NRF), South Africa which holds copies of all present and past research theses and dissertations dating back to the 1900s. This is the first step towards capturing knowledge which can then be disseminated and re-used by future researchers, thus avoiding replication and at the same time providing a learning platform for review of existing literature.

The authors of the US National Research Council study, *Bits of Power*, pointed out, 'The value of data lies in their use. Full and open access to scientific data should be adopted as the international norm for the exchange of scientific data derived from publicly funded research.'

Researchers in Kenya need to borrow a leaf from this study.

1.3 Problem Definition

When organizations in any industry work independently of each other and do not follow uniformly set standards, their data, experiences and findings are generally kept within individual organizational data banks. Such information is shared among themselves and other stakeholders only upon request.

Jafari, Akhavan and Mortezaei (2009) confirmed after analysing various studies conducted by De Tienne & Jackson, Anumba et al. and Beckman, that it is fundamental for knowledge within an industry to be shared and utilized as the enabler of innovation and learning.

The Association of African Universities, in its Database of African Theses and Dissertations Initiative (DATAD) notes that "African research results are rarely indexed in major international databases" and that "the inability to learn about and access African material is frustrating to students and scholars both on the continent and overseas". It points out that "requests for information on research outputs from Africa by researchers on the international scene are difficult to meet because most of the reports are in the traditional printed form in library shelves" (Mejabi, Babatunde, 2010).

By assessing several Wildlife Research organizations in Kenya, it is apparent that,

- Both explicit and tacit knowledge created as a result of research on Kenyan Wildlife largely exists in a distributed and disjointed format.
- There is no systematic approach prescribed for capturing, recording, processing, and dissemination of this knowledge in order to satisfy the needs of various stakeholders of Kenyan Wildlife research.

A Knowledge Management Framework is thus needed to enable and facilitate collaboration and sharing of knowledge within and among the various organizations that conduct Wildlife research in Kenya.

1.4 Project Justification

Most modern economies hinge their growth strategies on their resources, research, innovation and technological abilities. The introduction of the Research, Innovation and Technology (RIT) Sector in the period 2008/09-2011/12 marked an important policy decision geared towards making Kenya 'a Knowledge based economy'.

Vision 2030 sets a blueprint to build Kenyan economy, thereby meeting the Millennium Development Goals set by the United Nations. This research project would be justified as it is in line with achieving the goals of Vision 2030 by proposing ways to strengthen one of the big revenue earners of Kenya, its Wildlife.

Davenport and Prusak (in Sharif et al, 2005) assert that Knowledge is today the only source of sustainable competitive advantage in any organization. This research project proposes a framework to enable and enhance management of existing Knowledge, creation of new Knowledge and the ultimate sharing of this knowledge within the Kenyan Wildlife sector and its various stakeholders.

- As a result of implementing the proposed framework of Knowledge Management, the National Council for Science and Technology would have all research findings will be held in a systematically formatted data warehouse.

- By implementing set guidelines towards sharing of Wildlife research knowledge, future researchers would benefit greatly as unnecessary replication of research would be controlled.

- It would create a platform where researchers would share not only their findings but also their experiences, methodologies, successes and set-backs, thereby, assisting in future research.

- Such a platform would encourage continuous, not piecemeal sharing of research methods and proceedings on related research data sets.

- Such a framework would assist the industry by informing them about research programmes and their outcomes and appropriate channels for accessing them.

The proposed framework will take the rating of Knowledge Management maturation of the Kenyan Wildlife Sector to a much higher plane, thus promoting stakeholder confidence.

1.5   Research Objectives

1.5.1   General Objectives

This research project was to develop a holistic Framework of Knowledge Management that is suited to all Research organizations but is tailored to the Kenyan Wildlife Research organizations in particular.

1.5.2   Specific Objectives

1) To identify existing Knowledge Management Frameworks applicable to Wildlife Research
2) To establish current maturation level of Knowledge Management of Kenyan Wildlife Research
3) To propose a conceptual Knowledge Management Framework
   a. One that would advocate policies to promote timely sharing among various stakeholders and the authorizing agencies.
   b. One that would provide an underpinning for extension to the existing research.
4) To validate the Conceptual Knowledge Management Framework
5) To tailor the Conceptual Framework suited to Knowledge Management of Kenyan Wildlife Research

1.6   Research Questions

The following questions guided this research project in the development of the proposed Knowledge Management Framework:

1) What is the current Wildlife Research data management policy in sample research organizations within Kenya?
2) What are the challenges faced in managing and sharing of Wildlife Research data by the relevant organizations in the country?
3) What are the successes and lessons learnt by other organizations in Kenya that have implemented Knowledge Management?
4) Which are the existing Wildlife Research Knowledge Management Frameworks within the African continent and the rest of the world, which may be used as a reference point?
5) Which is the most appropriate Knowledge Management Framework that may address the challenges faced in the Wildlife Research organizations of the region?

1.7   Structure of the Report

Chapter One of the report provides a background and the status of Knowledge Management in the Wildlife Research sector of Kenya. It outlines the research problem, the justification and the research objectives.

Chapter Two forms a review of the literature studied on Knowledge Management. It covers a study and analysis of several frameworks suggested over the years.

Chapter Three conveys a step by step comparison of a few selected Knowledge Management frameworks thus resulting in some common elements. Using the highlighted elements, a conceptual framework for Knowledge Management of Wildlife Research was hence developed.

Chapter Four describes the Research Methodology used to validate the conceptual framework elements. It states the research design, sampling technique and the sampling frame utilized in data capture. It provides a description of all the research instruments used in the process.

Chapter Five provides an analysis and interpretation for the results of data capture. A series of steps were used to analyse data gathered from the researchers in the field.

Chapter Six presents the validated framework. It illustrates the validated elements of the conceptual framework. It further expounds on the additional elements that were highlighted as a result of data analysis. These elements customised the validated framework to the Kenyan context of Knowledge Management of Wildlife Research.

Chapter Seven discusses the achievements and limitations of the research study. It also provides recommendations for future research.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

How organizations of various shapes, sizes and of varying needs have achieved success through the deployment of Knowledge Management within their enterprises has been demonstrated as below in McCormick (2007).

- The World Bank has implemented the use of Knowledge-management technologies to fight poverty and disease in developing nations.

- Southern Co., the energy company that produces electricity for much of the Gulf Coast region, deployed an enterprise content management platform which ensured that service to its Mississippi customers was restored within 12 days of the 2005 hurricane.

- Shuffle Master, the manufacturer of automatic shuffling machines and chip counting products came up with a portal that could pull data on demand from more than 60 databases.

- Pratt & Whitney airline engines are constantly transmitting information about the status of their parts which is recorded and made available through a Web portal at the manufacturers. This information is used to ensure the ongoing health of the engines.

From the success of these and many other organizations in the world, it is appropriate to say that Knowledge Management is being adopted widely in business sectors of varied nature. Time is now ripe for Kenyan organizations as well to adopt Knowledge Management and reap the benefits of Knowledge sharing and Knowledge creation.

Nonaka and Takeuchi (1995) asserted that the reason why Japanese companies are able to develop fast and to innovate in new product development is mainly the result of their capacity to transfer and share Knowledge across their organizations.

2.2 Knowledge

Knowledge has been defined in many ways by various authors.

Beckman (in Xinhua Zhang, 2008) has compiled a number of definitions of Knowledge in general and organizational Knowledge in particular, some of which are quoted below:

- Knowledge is organized information applicable to program solving (Woolf, 1990).

- Knowledge is information that has been organized and analyzed to make it understandable and applicable to problem solving or decision making (Turban, 1992)

- Knowledge consists of truths and beliefs, perspectives and concepts, judgments and expectations, methodologies and 'know-how' (Wiig, 1993).

- Knowledge is the whole set of insights, experiences and procedures which are considered correct and true and which, therefore, guide the thoughts, behaviors and communication of people (Van der Spek and Spijkervet, 1997).

- Knowledge is reasoning about information to actively guide task execution, problem-solving and decision making in order to perform, learn and teach (Beckman, 1997).

- Intellectual capital residing in the brains of individuals, organizational processes, products, facilities, systems and documents, all put together make up what may be referred to as Knowledge.

Thus we can surmise from this that Knowledge is gotten by refining information. Information is an accumulation of facts, beliefs, experiences, methodologies, and the know-how of individuals. When organized and analyzed, Knowledge can augment the decision making process of organizations, thus providing them with a competitive edge.

Davenport and Prusak (2000) asserts that Knowledge is today the only source of sustainable competitive advantage in any organization. This unique resource must thus be protected, cultivated and shared within the company.

2.3 The Conceptual Hierarchy of Data, Information and Knowledge

Brinklow (2004) suggests that

> Data is disconnected collection of facts and observations about a domain that have little intrinsic interest.

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Information emerges from a domain when relationships between the facts are established and understood.

Knowledge emerges when the patterns of relationships are identified and understood.

Davenport and Prusak (1998) have conceptualized a hierarchy of Knowledge as illustrated below:
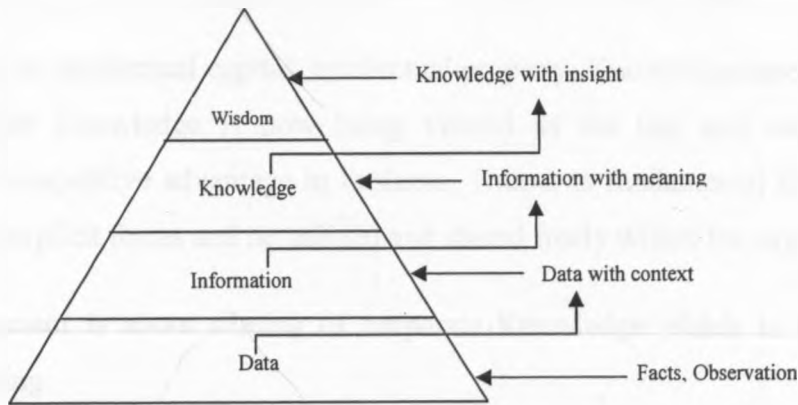
Figure 1: The conceptual hierarchy of Knowledge

2.4   Types of Knowledge:
Explicit and Tacit Knowledge

The most widely accepted Knowledge taxonomy among researchers and practitioners is the differentiation between explicit and tacit Knowledge.

Nonaka and Takeuchi (1995) describe Explicit Knowledge as, 'that which can be expressed in words and numbers'. It is easy to share explicit Knowledge in the form of hard data, scientific formulae or codified procedures.

Tacit Knowledge is, 'highly personal and hard to formalize' (Nonaka and Takeuchi, 1995). Subjective insights, intuitions, hunches and personal experiences fall into this category of Knowledge.

Explicit Knowledge in organizations may be typically found in documents and databases, while tacit Knowledge resides in the brains of people.

2.5   Knowledge Management

Davenport and Prusak (1998) describe Knowledge Management as a set of managerial activities related to the generation, codification and sharing of knowledge. It is a systematic process of capturing knowledge, organizing it, filtering it and presenting it in a way that improves understanding among stakeholders within an organization.

According to Davenport et al. (1998), "Knowledge management is concerned with the exploitation and development of the knowledge assets of an organization with a view to furthering the organization's objectives. The Knowledge to be managed includes both explicit, documented knowledge, and tacit, subjective Knowledge. Management entails all of those processes associated with the identification, sharing and creation of knowledge".

Variously referred to as intellectual capital, intellectual property, Knowledge assets, or business intelligence, corporate Knowledge is now being viewed as the last and only sustainable untapped source of competitive advantage in business. Thus it is fundamental that Knowledge be stored in its most explicit forms and be utilized and shared freely within the organization.

Knowledge Management is about sharing of corporate Knowledge which is the enabler of innovation and learning.

The purpose of Knowledge Management is to make organizations more efficient and effective, thus be aligned with organizational strategy for the support of achieving organizational objectives.

Wiig (1997) envisaged below timeline for Knowledge Management adoption
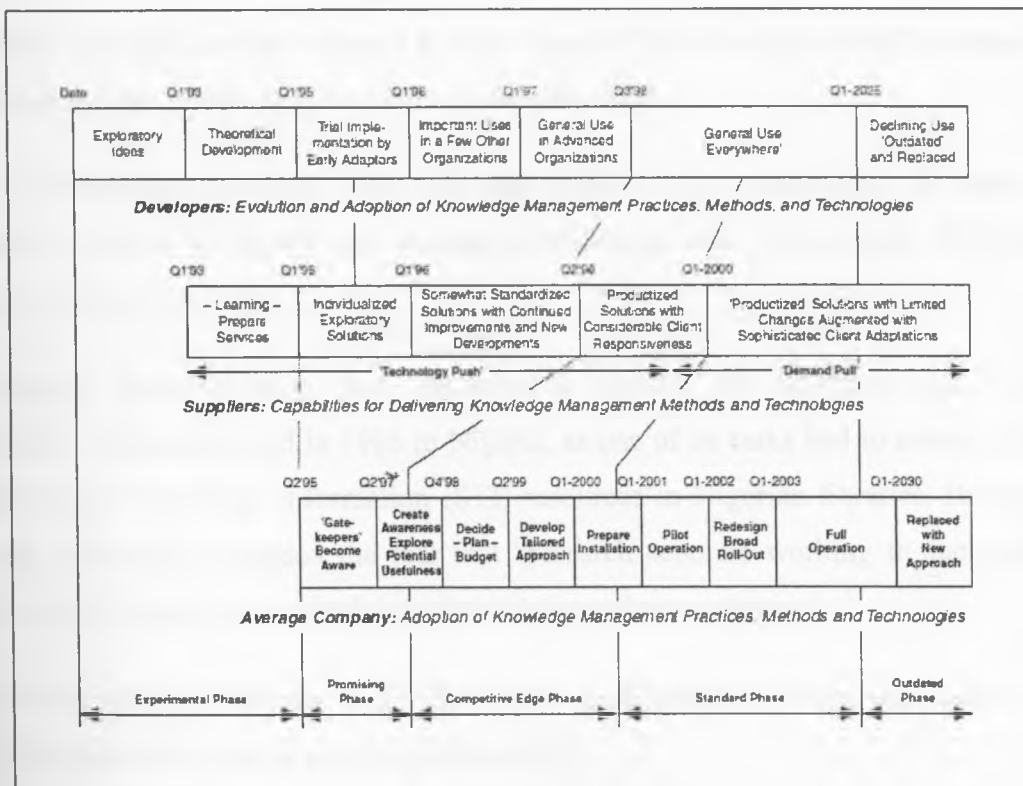
Figure 2: Possible scenario for adopting KM methods, practices and technologies

As per the figure above, an average company today should be in the phase of full adoption of Knowledge Management practices. Research has shown that Kenyan Wildlife Research sector, to date, is far from reaching this goal.

An explanation of the generation system can be garnered from the table below as presented by Amidon and Skyrme (1997).

	1st	2nd	3rd	4th	5th
	Technology as the Asset	Project as the Asset	Enterprise as the Asset	Customer as the Asset	Knowledge as the Asset
Core Strategy	R&D in Isolation	Link to Business	Technology/Business Integration	Integration With Customer R&D	Collaborative Innovation System
Change Factors	Unpredictable Serendipity	Inter-dependence	Systematic R&D Management	Accelerated Discontinuous Global Change	Kaleidoscopic Dynamics
Performance	R&D as Overhead	Cost-Sharing	Balancing Risk/Reward	'Productivity Paradox'	Intellectual Capacity/Impact
Structure	Hierarchical, Functionally Driven	Matrix	Distributed Coordination	'Multi Dimensional' Communities of Practice	Symbiotic Networks
People	We/They Competition	Proactive Cooperation	Structured Collaboration	Focus on Values and Capacity	Self Managing Knowledge Workers
Process	Minimal Communication	Project to Project Basis	Purposeful R&D/Portfolio	Feedback Loops and 'information persistence'	Cross-Boundary Learning and Knowledge Flow
Technology	Embryonic	Data-Based	Information-Based	IT as a Competitive Weapon	Intelligent Knowledge Processors

Figure 3: The Generation Gap

The Wildlife Research sector in Kenya is quite a way off from being in the 5th generation that Amidon and Skyrme allude to above, even in the year 2010.

Mejabi and Babatunde (2010) state that the challenge for researchers in many African institutions is access to timely and relevant publications both from within their immediate regions and the world at large.

The National Documentation and Information Centre for Sciences and Technology (NADICEST) Project founded in 1985 in Nigeria, as one of its tasks had to create an inventory of Science and Technology Information (STI) resources in Nigerian libraries. Ike (in Mejabi, Babatunde 2010) had expressed the fear that "research scholars working in such information isolation may be engaged on wasteful duplicated research programmes".

This research project proposes to facilitate such collaboration within the Kenyan Wildlife Sector, as suggested by Mejab and Babatunde (2010).

2.6   The Process of Knowledge Creation

According to Nonaka and Takeuchi (1995) SECI model, much of the value of Knowledge is created as it is transformed through four different modes of interaction between tacit and explicit Knowledge as shown below:
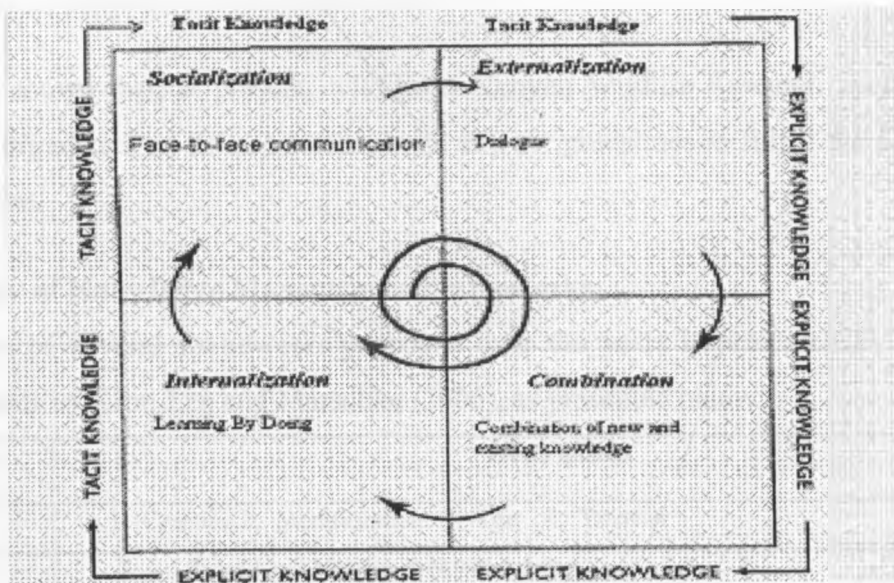
Figure 4: SECI model by Nonaka and Takeuchi

1. **Socialization** is the exchange of experiences whereby personal Knowledge is being created in the form of mental models.   Socialization comprises individuals sharing their tacit Knowledge by being involved together in joint activities. In practice, socialization would mean people to people and face to face contact.

2. **Externalization** involves the conversion from tacit Knowledge to explicit Knowledge in the form of metaphors, analogies, hypotheses and models. The process of externalization requires interaction between individuals in order to articulate their understanding in the form of images, models, or words (often as stories or metaphors).   For externalization to take place, individuals need to have confidence and trust that their ideas will be taken seriously by their peers and due acknowledgment accorded to them. Communities of Practice are important settings for the externalization of Knowledge because they are built on trust.

3. **Combination** involves synthesis of individual explicit Knowledge into a Knowledge system. Combination consists of the conversion of different sources of explicit Knowledge into complex systems of explicit Knowledge that can be made available in the organization. Combination includes collecting, processing, validating, testing and then disseminating Knowledge.   Combination is the phase where Knowledge Management approaches such as Communities of Practice and the use of Information and Communication Technology can be of particular value.

4. **Internalization** involves the conversion of explicit Knowledge into tacit Knowledge such that it forms mental models in individuals. It is then reflected in the organization's culture. Internalization is promoted through an exchange of dialogue and through training. The process of Internalization is achieved by making corporate Knowledge available in the form of documents, manuals, models and stories.

Research has shown that, at present, within the Kenyan Wildlife Research Sector researchers and research organizations do not comply with any set guidelines to fulfill the SECI model as presented above.

2.7 Review of Knowledge Management Frameworks

A comparison of several frameworks proposed over the years is presented by Abdulla et al (2005), and later by Kim, Lee and Marschke (2006), as presented below:

Frameworks	Descriptions
Wiig, 1993	1. Creation 2. Manifestation 3. Use 4. Transfer
Leonard-Barton,1995	1. Shared and creative problem solving 2. Importing and absorbing technological Knowledge from the outside of firm 3. Experimenting and prototyping 4. Implementing and integrating new methodologies and tools.
Arthur Anderson and APQC, 1996	1. Share 2. Create 3. Identify 4. Collect 5. Adapt 6. Organize 7. Apply
Choo, 1996	1. Sense making (includes "information interpretation") 2. Knowledge creation (includes "information transformation") 3. Decision making (includes "information processing")
Nonaka, 1996	1. Socialization (conversion from tacit Knowledge to tacit Knowledge) 2. Internalization (conversion from explicit Knowledge to tacit Knowledge) 3. Combination (conversion from explicit Knowledge to explicit Knowledge) 4. Externalization (conversion from tacit Knowledge to explicit Knowledge)
Szulanski, 1996	1. Initiation (recognize Knowledge need and satisfy that need) 2. Implementation (Knowledge transfer take place) 3. Ramp-up (use the transferred Knowledge) 4. Integration (internalize the Knowledge)
Van der spek and Spijkervet, 1997	1. Develop 2. Distribute 3. Combine 4. Hold
Alavi, 1997	1. Acquisition (Knowledge creation and content development) 2. Indexing 3. Filtering 4. Linking 5. Distributing 6. Application.
Dataware Technologies, 1998	1. Identify business problem 2. Prepare for change 3. Create Knowledge management team 4. Identify missing Knowledge and organize it 5. Define technological infrastructure 6. Phase Knowledge management activities in seven steps 7. Link people to Knowledge.

Xerox Corporation, 1999	1. Discovery - identify business goals, Challenges and opportunities 2. Define – determine key requirements and scope of the project 3. Start-up – detailed project plan is developed 4. Delivery – implement the plan 5. Evaluation – ensure results meet expectations and facilitate Knowledge transfer.
Wiig, 1999	Lists sixteen major Knowledge Management building blocks. Four are related with implementation: 1. Survey and map the Knowledge landscape 2. Plan the Knowledge strategy 3. Create and define Knowledge-related alternatives and potential initiatives 4. Monitor Knowledge management.
Gore and Gore, 1999	1. Exploit existing explicit Knowledge 2. Capture new explicit Knowledge 3. Create tacit Knowledge 4. Convert tacit into organizational Knowledge.
Chase, 2000	Eight dimensions out of which two are related with implementation: 1. Establish an enterprise Knowledge culture 2. Maximize the value of the enterprise's intellectual capital.
Libowitz, 2000	1. Transform information into Knowledge 2. Identify and secure Knowledge 3. Capture and secure Knowledge 4. Organize Knowledge 5. Retrieve and apply Knowledge 6. Combine Knowledge 7. Create Knowledge 8. Learn Knowledge 9. Distribute/sell Knowledge
Mentzas, 2001	1. Knowledge assets - the heart of the framework 2. Knowledge strategy 3. Process 4. Structure 5. System
Rubinstein-Montano et al., 2001 b	SMART vision 1. Strategize 2. Model 3. Act 4. Revise 5. Transfer.
Holsapple and Joshi, 2002	Three main building blocks: 1. Knowledge resources 2. Knowledge Management activities 3. Knowledge Management influences.
Jarrar, 2002	1. Set strategic priority 2. Define and understand organizational Knowledge 3. Manage Knowledge 4. Create Knowledge environment.
Chih-Ping et al., 2002	1. Knowledge resources 2. Knowledge management activities 3. Knowledge influences.

Table 1: A Review of Knowledge Management Frameworks

Wong and Aspinwall (2004) classified different Knowledge Management frameworks into three broad categories namely, Step, System or Hybrid.

Step approach

Step approach frameworks provide a series of steps to be followed for the Knowledge Management implementation process. Step approach frameworks are thus 'prescriptive' in nature.

System approach

A system approach characterizes Knowledge Management in the form of a graphical representation, with the aim of providing a systemic and holistic perspective on Knowledge Management implementation. Key constructs and elements are put together to provide an overview of their relationship. System approach frameworks are taken as 'descriptive' in nature.

Hybrid approach

The hybrid approach however, contains elements of both the approaches thus, describing the overall perspective of the key concepts as well as prescribing steps to be followed for Knowledge Management.

For the purpose of this study the above listed frameworks were categorized and the selected ones studied further.

2.8 Wiig Framework, a Step approach

Wiig (1999) introduced a set of 16 building blocks in a step-wise manner to guide the introduction of Knowledge Management practices in an organization. They were presented in the following order of implementation:

1) Obtain management buy-in.
2) Survey and map the Knowledge landscape.
3) Plan the Knowledge strategy.
4) Create and define knowledge-related alternatives and potential initiatives.
5) Portray benefit expectations for Knowledge Management initiatives.
6) Set Knowledge Management priorities.
7) Determine key Knowledge requirements.
8) Acquire key Knowledge.
9) Create integrated Knowledge transfer programmes.
10) Transform, distribute and apply Knowledge assets.
11) Establish and update a Knowledge Management infrastructure.
12) Manage Knowledge assets.
13) Construct incentive programmes.
14) Coordinate Knowledge Management activities and functions enterprise-wide.
15) Facilitate Knowledge-focused Management.

16) Monitor Knowledge Management.

Although this framework enlisted the steps for Knowledge Management implementation, some building blocks can be identified. These are:
1) Knowledge strategy
2) Knowledge Management initiatives
3) Knowledge assets
4) Knowledge Management infrastructure
5) Incentive programmes
6) Knowledge Management activities

2.9   Mentzas Framework, a Hybrid approach

Mentzas (2001) suggested a framework to leverage the value of organizational assets. It is portrayed with the following elements and structure:

(1) Knowledge assets that need to be managed are at the heart of the framework.

(2) Knowledge strategy, process, structure and system, which are needed to facilitate knowledge-related activities, surround the knowledge assets.

(3) Knowledge interaction networks at the individual, team, organizational and inter-organizational levels make up the outer periphery of the framework.

In addition, Mentzas (2001) outlined certain phases that can help the thinking and planning of a KM project. They are:

(1) Awareness - gain awareness about the importance and benefits of KM

(2) Plan - determine the vision, scope and feasibility of the KM initiative

(3) Develop - build, test and review the design of an holistic solution for KM

(4) Operate - roll out a company-wide KM implementation

(5) Measurement - measure the effectiveness of the KM initiative

(6) Training - provide training to the knowledge workers and staff on the new processes and technologies.

The diagram below depicts the elements of the framework.
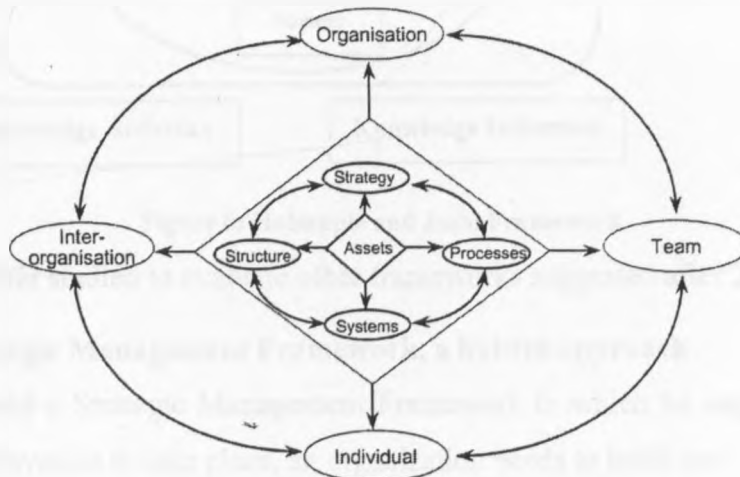
Figure 5: Mentzas Framework

2.10   Holsapple and Joshi Framework, a System approach

Holsapple and Joshi (2002) proposed a threefold Knowledge Management framework with the main building blocks, namely Knowledge resources, Knowledge Management activities and Knowledge Management influences.

The knowledge resources component represented the organization's pool of knowledge that was embodied in all of the six types of organizational resources namely, knowledge held by people, culture, infrastructure, knowledge artifact, purpose and strategy.

The Knowledge Management activities comprised the processes that an organization should use to manipulate its knowledge resources. These were stated as: acquiring, selecting, internalizing and using Knowledge. Here using Knowledge was taken as a culmination of both generation and externalization of knowledge.

Knowledge Management influences were grouped into three categories namely, resource (financial, human, Knowledge and material), managerial (leadership, coordination and measurement) and environmental (competitors, customers, markets, suppliers and other 'climates').

The below graphic has thus been drawn as a representation of these elements.
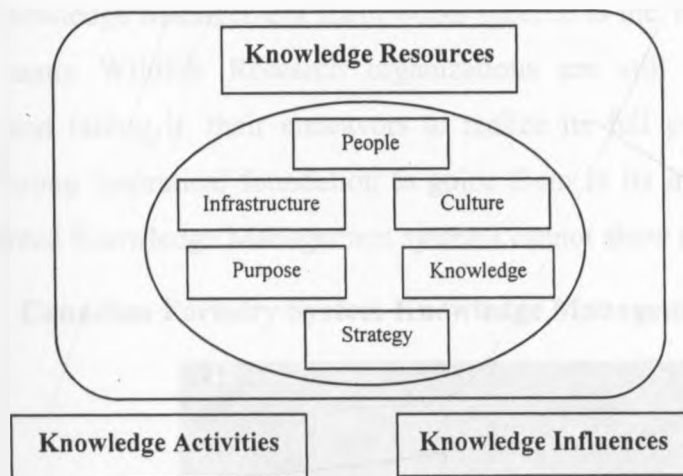
Figure 6: Holsapple and Joshi Framework

Literature was further studied to evaluate other frameworks suggested after 2002.

2.11 Lee's Strategic Management Framework, a hybrid approach

Lee (2006) proposed a Strategic Management Framework in which he suggested that in order for Knowledge Innovation to take place, an organization needs to build the:

- Human Capital by enforcing Knowledge centred principles
- Structural Capital by strengthening the Knowledge sharing infrastructures and
- Intellectual Capital by focusing on the Knowledge based initiatives.

The Human Capital element was represented here by the People element. Processes made up the Structural Capital. The Products were the Intellectual Capital.
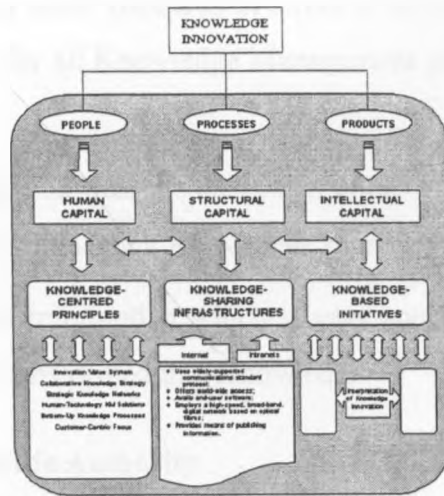
Figure 7: A Strategic Management Framework

2.12   Review of Knowledge Management in the Wildlife Sector

All the frameworks studied above were generic in nature. Research did not present sufficient evidence of Knowledge Management frameworks specific to the Wildlife Research sector. One reason why many Wildlife Research organizations are still struggling with Knowledge Management and failing in their endeavors to realize its full potential is that they lack the support of a strong theoretical foundation to guide them in its implementation. The ones that have implemented Knowledge Management systems cannot show a framework to guide them.

i.   Canadian Forestry System Knowledge Management Framework

Figure 8 : Canadian Forestry System (CFS) Knowledge Management Framework

Simard A. (2005), presented Canadian Forestry System Knowledge Management Framework based on five main building blocks: People, Tools, Organization, Processes and Content.

People need motivation, appreciation, rewards, and incentives, in order to utilize tools (the infrastructure and systems) to facilitate Knowledge Management processes.

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The organization needs to set some standards in terms of its roles and responsibilities such that the content can be managed for all Knowledge Management processes in the Canadian Forestry Department.

Processes included the lessons learnt, the experience, the best practices followed and organization work routines to implement Knowledge Management.

Content here is the data and information which is very specific to the needs of the Canadian Forestry Department that is transformed into Knowledge.

ii. Uganda Wildlife Authority

Uganda Wildlife Authority (UWA) has been using Spatial Management Information System (MIST) for Knowledge Management of their Wildlife data since 2002, as quoted on the website. MIST provides managers and planners with up-to-date information for planning, decision-making and evaluation. MIST is formulated on three main building blocks namely, Organizational set-up, Technology and Behavioral principles.

CHAPTER THREE
CONCEPTUAL FRAMEWORK

3.1 Comparison of the Referenced Frameworks

Below is a table comparing the five main frameworks studied this far. Elements have been categorized as they appear in each of the frameworks. Their commonality is analysed in order to extract the crucial elements to be suggested for the conceptual framework.

Elements suggested in the frameworks studied				
Wiig	**Mentzas**	**Holsapple & Joshi**	**Lee**	**Canadian Forestry System**
Knowledge Assets	Knowledge Assets	Knowledge	Products	Content
Knowledge Management Infrastructure	Structure	Infrastructure	Knowledge Management Infrastructure	Tools (Infrastructure & System)
	Systems			
Knowledge Management Activities	Processes	Knowledge Activities	Processes	Processes
	People	People	People	People
Knowledge Strategy	Strategy	Strategy		
Incentive Programmes	Training	Knowledge Influences	Knowledge Centered Principles	Incentive Programmes
Knowledge Management Initiatives			Knowledge Management Initiatives	
		Purpose		Organization Roles, Responsibilities
		Culture		

3.2 Assumptions for Conceptual Framework Elements

The conceptual framework elements were suggested based on the following assumptions.

Knowledge

For the purpose of this report we shall treat the terms Knowledge assets, Knowledge, Product and Content as synonymous. Knowledge is the key focal point for studying Knowledge Management.

People

This is an element mentioned directly or indirectly, in all the frameworks studied above. People bear the Knowledge. People are needed in the actual Knowledge transfer and creation.

Infrastructure

The definition of systems according to the online business dictionary is, "an organized, purposeful structure regarded as a 'whole' consisting of interrelated and interdependent elements. These elements continually influence one another to maintain their activity and the existence of the system, in order to achieve the common purpose the 'goal' of the system". The worldnetweb dictionary defines infrastructure as, "the basic structure or features of a system or organization"

Thus we shall take both terms systems and infrastructure as one, for the context of this section of the report.

Processes

Online business dictionary defines an activity as, "Measurable amount of work performed to convert inputs into outputs". It defines a process as, "Sequence of interdependent and linked procedures which, at every stage, consume one or more resources (employee time, energy, machines, money) to convert inputs (data, material, parts, etc.) into outputs." Thus for the sake of this discussion we shall use Knowledge related activities and processes as interchangeable terms.

Factors to Promote Knowledge Management

Online business dictionary and other sources were used to understand the meaning of the given terms.

Strategy is defined as alternative chosen to make a desired future happen, such as achievement of a goal or solution to a problem. Strategy refers to a plan of action designed to achieve a particular goal; action or activity leading to the completion of an objective.

Purpose is defined as "that which a person sets before himself as an object to be reached or accomplished; the end or aim to which the view is directed in any plan, measure, or exertion; view; aim; design; intention; plan."

Initiative represents an enterprise's readiness to embark on a new venture. Generally speaking, the motivation for an initiative arises from a desire to accomplish something that would benefit the enterprise.

Culture is defined as "a set of beliefs, values, and norms, together with symbols like dramatized events and personalities that represents the unique character of an organization, and provides the context for action in it and by it." Organizational culture is the sum total of an organization's past and current assumptions, experiences, philosophy, and values that hold it together, and are expressed in its self-image, inner workings, interactions with the outside world, and future expectations. It is based on shared attitudes, beliefs, customs, express or implied contracts, and written and unwritten rules that the organization develops over time and that have worked well enough to be considered valid.

In economics and sociology, an **incentive** is any factor (financial or non-financial) that enables or motivates a particular course of action, or counts as a reason for preferring one choice to the alternatives. It is an expectation that encourages people to behave in a certain way. It is a tangible or intangible inducement or reward that is designed to motivate a person or group to behave in a certain way.

Thus it may be concluded that the terms **strategy, purpose, initiatives, culture** and **incentives** were all mentioned in the frameworks studied. These are the soft factors that enhance Knowledge transfer and its creation. Thus they will be grouped together and called **Factors to promote Knowledge Management**.

3.3 Conceptual Framework Elements

Thus the elements that assisted in the development of the conceptual Knowledge Management framework are:

1) Knowledge
2) People
3) Processes
4) Infrastructure
5) Supplementary Factors to promote Knowledge Management
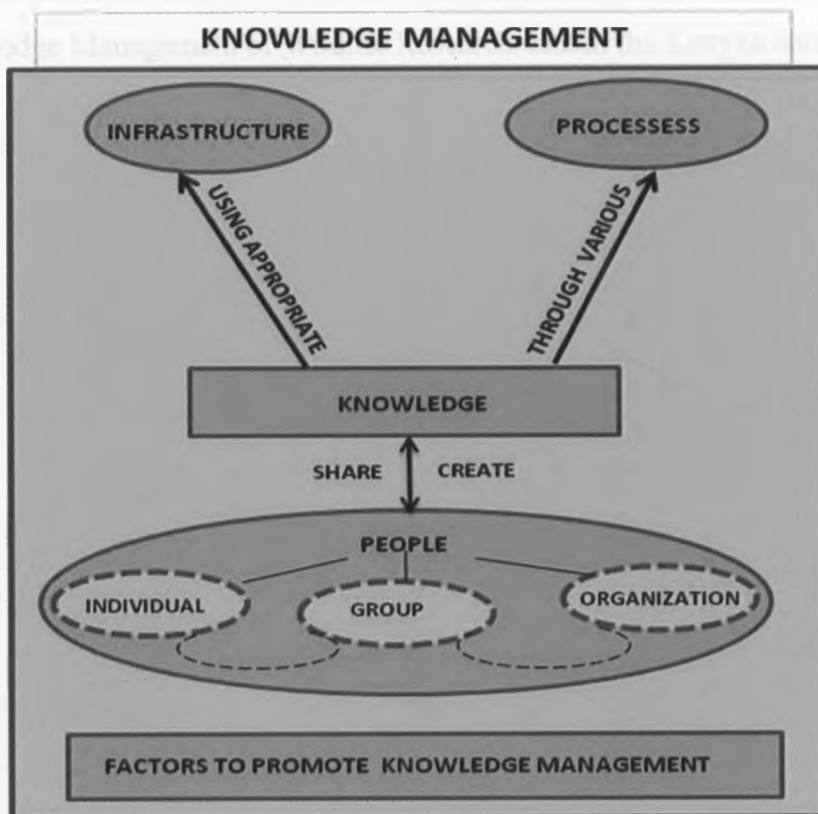
Figure 9: Conceptual Framework

Individuals share and create Knowledge through collaboration among themselves, thus forming a group. Various groups collaborate to form an organization. An organization may then collaborate with other organizations to share and create Knowledge. All this is part of the People element in the conceptual framework.

Knowledge is the pivot that brings about the need to share and create more Knowledge.

People share thus, creating Knowledge through various Knowledge Management Processes.

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For effective Knowledge Management to take place, appropriate Infrastructure should be in place. Infrastructure here is a collection of technological and other systems necessary for managing Knowledge in an organization.

The referenced frameworks studied mentioned several factors that would promote Knowledge Management in an organization. Some of these are organizational strategy, incentives, initiatives, purpose and organizational culture.

This conceptual framework was tested using appropriate research instruments. Data was gathered, cleaned, coded and analysed thus highlighting the elements for the suggested framework. Data collected was also analysed to ascertain any other elements that would be critical to Knowledge Management of Wildlife Research data in the Kenyan context.

CHAPTER FOUR
RESEARCH METHODOLOGY

4.1 Research Design

According to McMillan and Schumacher (1997) a research design refers to a plan and structure of the investigation that is used to obtain evidence in order to answer the research questions.

The research design adopted in this research study was a mix of quantitative and qualitative in nature. The closed type of questions had a set of given choices. Responses to such questions could be coded numerically hence, analysed quantitatively. There were also some open-ended questions. These intended to mainly gather the respondents' views, thus had to be left un-biased and open. Responses to this type of questions were coded using qualitative, thematic analysis. Categories and patterns were formed out of raw text using textual analysis software.

Golafshani (2003) defines qualitative research as any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification.

Qualitative research is used to explore, understand, explain and describe phenomena from the participants' perspectives (Ploeg, 1999).

Data gathering was aimed at evaluating the conceptual framework elements namely, Infrastructure, Processes, People, Knowledge and the Factors that promote Knowledge sharing in an organization.

4.2 Target Population and Sampling Technique

The target population for this research study were the researchers who conducted research both inside as well as outside the protected areas of the Kenyan Wildlife habitat. The intention was to target the population from research areas spread throughout the country.

A stratified random sampling approach was used. The target population was divided into two categories:

- Protected research areas managed by Kenya Wildlife Service
- Unprotected research areas privately owned

The Twenty Four organizations that participated were:

Organization Name	No. of Respondents
Centre for Training and Integrated Research in Arid and Semi Arid Land Development (CETRAD)	3
Earth Watch Institute	1
East Africa Utalli Institute	1
Ewaso Lions	1
International Livestock Research Institute	1
International Primate Institute	1
Kenya Wildlife Service	9
Kilimanjaro Lion Conservation Project	1
Laikipia Wildlife Forum	1
Lewa Wildlife Conservancy	1
Ministry of Livestock Development	1
Moi University	1
Mpala Research Centre and Conservancy	2
Narok University College	1
National Museums of Kenya	4
Nature Kenya, The Peregrine Fund	1
Ol Pejata Conservancy	2
People, Innovation and Change in Organizations (PICO Team)	1
Princeton University	2
Tsavo East Lion Research	1
University College London	1
University of Nairobi	3
World Wildlife Fund	1
Zieitz Foundation	1

Table 2: A List of Organizations that Participated

4.3   Sampling Frame

Mugenda & Mugenda (2003) suggested that one should define the population as consistently as possible with the intended purpose of study.   Where time and resources allowed, a research should take as big a sample as possible, since this would ensure reliability of the results.

According to Kenya Wildlife Service there were Thirty Two protected areas spread throughout the country.

There was no definite count available from any of the authoritative bodies, for the unprotected, privately managed research centres. Thus for the case of this study it was assumed to be Thirty Two also.

This brought the total estimated population to be Sixty Four research centres. Maximum sample population was intended to be targeted.

4.4 Research Instrument Types

Existing literature was studied to identify the conceptual framework elements. Data was collected to validate these elements, with an aim to highlight other critical elements that would lead to effective Knowledge management. In order to collect data that was representative and reliable, a combination of data collection tools, namely questionnaires, interviews, and observation were used.

i. Literature Study

As included in Chapter Two of this report, a thorough study was conducted on previous research conducted on Knowledge Management and the frameworks suggested in the field. After comparing several of the frameworks studied, a conceptual framework was developed. The remaining instruments were used to validate this conceptual framework.

ii. Questionnaires

Questionnaires were distributed to researchers and managers involved with research throughout the country. Names of the respondents and their organization were kept optional. This was meant to boost the confidence of the respondents. Various sections of the questionnaire were designed to meet different objectives of the study. Mapping of objectives to the questionnaire is included at the end of this chapter.

A mix of closed, multi choice questions as well as open-ended questions was used. Closed questions were used to facilitate easy responses. Open-ended questions were added to gather the respondents' views. This section was very crucial in validating the conceptual framework.

A pilot test of the first version of the questionnaire was run with a senior scientist at the Kenya Wildlife Service Headquarters, Nairobi. The necessary adjustments were made and the modified version then circulated. See Appendix 1 for questionnaire used.

iii. Interviews

Wherever time and other resources allowed, interviews were conducted with the key respondents. The design of the interviews followed the structure of the questionnaire. In addition to the structured questions being answered, lot more was learnt through this personal interaction.

Interviews provided the researcher opportunities to use the interviewing techniques such as prompting and probing to open up important information from the respondent.

iv. Observation

The centres visited enabled observation of the ongoing research processes. It confirmed the methods used to gather data, to store it and also to present it. The type of networking and collaboration taking place on ground was confirmed. It validated the collaboration within researchers of similar interests within an organization as well as with other organizations.

4.5 Research Instrument Testing

i. Reliability Testing

The first step in data analysis was to test for reliability and validity of data collection instruments. Validity referred to the extent of what was being measured and its suitability to the research objectives. Reliability on the other hand, was concerned with questions of stability and consistency - did the same measurement tool yield stable and consistent results when repeated over time. The questions should yield consistent responses when asked multiple times - this is reliability. Similarly, the questions should get accurate responses from respondents - this is validity.

ii. Validity Testing

Validity testing comprised Face, Content, Construct and Criterion related validity testing.

a) Face Validity

This criterion was an assessment of whether a measure appeared, on the face of it, to measure the concept it intended to measure. This required an intuitive judgment. This was done by categorizing questions into sections, each targeting an area from the research objectives suggested in the earlier sections of this report.

b) Content Validity

Content validity confirmed the extent to which a measure adequately represented all facets of a concept. This was a non-statistical type of validity that involved the systematic examination of the test content to determine whether it covered a representative sample of the behaviour domain. This testing of validity was performed by a panel of experts who reviewed the specifications of selected items through a piloting test on questionnaire and interview. As a result, necessary adjustments were made following the input of these pilot samples.

c) Construct Validity

Construct validity referred to the totality of evidence about whether a particular operationalization of a construct adequately represented what was intended by theoretical account of the construct being measured. It measured the extent to which one measure was related to another as specified in the conceptual framework.

d) Criterion-Related Validity

Criterion-related validity applied to instruments that had been developed for usefulness as indicator of specific trait or behaviour, either now or in the future. This highlighted the measure of themes chosen to represent the building blocks proposed in the conceptual framework.

4.6 Mapping of Objectives onto Research Methodology

	Research Objectives	How they were achieved
1	To identify existing Knowledge Management Frameworks applicable to Wildlife Research	Through **Literature Study** on Knowledge Management in general and on Wildlife research in particular.
2	To establish maturation level of Knowledge Management of Kenyan Wildlife Research	Through **Interviews** held with personnel at NCST, KWS, NMK and other key stakeholders in Kenyan Wildlife Research sector.
3	To develop a Conceptual Knowledge Management Framework	Through comparison of referenced Knowledge Management frameworks selected from **Literature Study**.
4	To validate the Conceptual Knowledge Management Framework	Through analysis of data collected using **Questionnaires** and **Interviews**.
5	To tailor the Conceptual Framework suited to Knowledge Management of Kenyan Wildlife Research	As a result of **Data Analysis** and its **Interpretation**, Conceptual framework elements were confirmed and additional elements were highlighted.

Table 3: Mapping of Objectives onto Research Methodology

CHAPTER FIVE
RESULTS AND DISCUSSION

5.1 Data Preparation

The first step was to examine all questionnaires and clean the data, preparing it for analysis.

A combination of quantitative and qualitative types of analysis was adopted depending upon the type of questions asked, as illustrated in the table below.

Sections 1.1 through to 3.6 of the questionnaire had a set of multiple choices to select from. These options were thus coded numerically and analyzed using SPSS and Spreadsheet software.

Sections 3.7 through to 4.5 of the questionnaire were used to gather opinions of the respondents. Data obtained in the form of in-depth interviews was cleaned and sorted into so textual patterns. These patterns were then analyzed using thematic analysis as suggested by Aronson (1994) with the aid of SPSS and Spreadsheet Software.

Questions	Data Type	Processing	Analysis	Software
1.1 - 3.6	Closed Multiple Type Questions	Numerical Coding	Quantitative	Spreadsheet, SPSS
3.7 - 4.5	Open-ended Questions	Literature Study to form themes	Iterative Thematic (Qualitative): - Hermeneutic - Content - Pattern	- SPSS - Online TextAlayser - Spreadsheet Text Analysis

Table 4: Data Processing and Analysis Methodology

While data processing involved cleaning, editing and coding of raw data, classification and tabulation of this data comprised the next stage of data analysis in order to get patterns or relationship among data groups.

5.2 Data Analysis

Data was analysed using sequence of three steps.

i. Hermeneutics analysis

The first step was to use Hermeneutics analysis, whereby the whole text of the interview was broken down into smaller packets and attempts were made to understand the meaning from that level of fragmentation.

ii. Content analysis

This was followed by Content analysis. This used a systematic approach to summarize data packets into categories or themes. The coding here involved identifying content from transcripts of interviews and questionnaires. The content was either a word or a phrase that was used by the respondents. This mode of analysis identified similarities and differences in the transcribed text, in order to corroborate or refute the conceptual framework elements.

iii. Pattern analysis

From the transcribed conversations, patterns of experiences were listed that arose from direct quotes or paraphrasing common ideas. The next step was to identify all data that related to the already classified themes. All of the content that fitted under the specific pattern was identified and placed with the corresponding pattern according to the steps suggested by Aronson (1994).

Themes were identified by "bringing together components or fragments of ideas or experiences, which often are meaningless when viewed alone", Leininger, 1985 (in Aronson, 1994). This was then pieced together to form a comprehensive picture of their collective experience.

The next step was to build a valid argument from analysing each theme formed. This was done by comparing these themes with the conceptual framework elements suggested in Chapter Three.

Conceptualization played a major role in the qualitative analysis of the research data.

5.3 Interpretation of Results

Each section of the questionnaire was analysed individually, the results then interpreted cumulatively to extract patterns of similarities and disparities respectively.

5.3.1 Respondent Population

Respondents	Number	Percentage
Total No. of respondents contacted through interviews	40	42%
Total No. of respondents contacted through questionnaires	56	58%
Responses received from Interviews	40	100%
Responses received from Questionnaires	18	32%
Cumulative Responses received	58	60%
No response received	38	40%

Table 5: Targeted Population

Out of the total 96 respondents targeted, 40 were interviewed whereas questionnaires were distributed to 56 others. The net responses received made a total of 60%.

5.3.2 Analysis of the Respondents Gender

Gender	Respondents	Percentage
Male	42	72%
Female	16	28%

Table 6: Gender

The researchers needed to be in the remote parts of Kenya, out in the field most of the year round when the research is ongoing. Some of these factors appeared to be unfavourable to the female population of the researchers, hence the disparity in gender.

5.3.3 Respondents Age Groups

Age Bracket	Responses
25-35	17
36-50	24
51 Plus	17

Table 7: Age in Years

The respondent population fell in the age group whose responses could be relied upon.

5.3.4 Respondents Level of Education

Level of Education	Responses	Percentage
Diploma	2	4%
Under Graduate	7	11%
Post Graduate	20	35%
Doctoral	29	50%

Table 8: Level of Education

15% of the respondents were diploma holders and under-graduates. The remaining 85% of the respondents were holders of post graduate and doctoral degrees. Thus we can assume that the responses were dependable as they came from credible authorities in the field.

From this point onwards in the analysis of data, percentages were not indicated as an overlap of criteria resulted in cumulative percentage of above a 100%.

5.3.5 Nature of Respondent's Organization

Nature of Organization	Responses
Research Organization	29
University	24
Government	17
Others	3

Table 9: Nature of Organization

There was an overlap seen in the nature of the organizations.

5.3.6 Nature of Respondent's Area of Research

Fields of Research	Responses
Bio-diversity	24
Ecological Monitoring	39
Human Wildlife Conflict	37
Species Monitoring	32
Veterinary/Biomedical	11
Others	17

Table 10: Nature of Research

The various fields of research were well represented. Most researchers had overlapping interests in various research fields. It was found that Veterinary/Biomedical was the least represented because of being the most expensive of all categories.

The category 'Others' comprised of:
a) Environmental Education
b) Tourism Development
c) Rangeland Rehabilitation
d) Habitat Management
e) Assessing the utilization and development of Arid and Semi Arid Lands
f) Wildlife Tourism
g) Development and evaluation of sampling techniques for counting animals

5.3.7 Respondent's Experience in Research

Years of Experience	Responses
Between 1 and 5 Years	11
Between 6 and 10 Years	16
Over 10 Years	31

Table 11: Experience in Years

81% of the respondents had more than 5 years of research experience. This lent confidence to their responses being reliable. The respondents who were new in the field of research could be seen to bring in new methods of Knowledge Management in Wildlife Research.

5.3.8 Extent of Technology used in Data Gathering Activities

Mode	Frequency
Manually	5
Electronically	0
Both modes	53

Table 12: Mode of Data Collection

Only 5 respondents used manual methods alone to gather data. A much larger proportion stated that they engaged both manual and electronic methods. The electronic media for data collection were found to be a collection of disparate tools like infrared cameras, body heat sensors, transmitters and receivers with Geographic Positioning capabilities and hand held Personal Digital Assistants.

5.3.9 Extent of Technology used in Data Storage

Mode	Frequency
Store Data Manually	0
Store Data Electronically	4
Store Data in both modes	54

Table 13: Storage of Data

No respondents stored their data in manual files. Most of the respondents affirmed to use both manual and electronic modes.

5.3.10 Extent of Technology used in Storing Research Experiences

Mode	Frequency
Store Experience in their Head	12
Document Experience Manually	35
Document Experience Electronically	46

Table 14: Storage of Research Experience

It was seen that most of the researchers converted the tacit knowledge of their experience, successes, pitfalls, methods etc. into well documented explicit knowledge. This was the first confirmation of Knowledge Management being practiced informally by Wildlife researchers.

5.3.11 Extent of Technology used in Presenting Research Findings

Mode	Frequency
Present findings Manually	1
Present findings Electronically	8
Present findings in Both modes	49

Table 15: Presentation of Research Findings

Only 1 respondent presented the findings using manual methods alone. This comprised verbal workshops held with communities that shared their habitats with the Wildlife. As research findings needed to be communicated in the language and at the level that was conducive to the local communities, no electronic means were adopted. The rest comfortably used technology for presenting their findings.

Comments on use of Technology

Below is a graphical illustration comparing the use of technology in all the processes, from collection to storage of research Knowledge and its presentation, as used by the respondents.
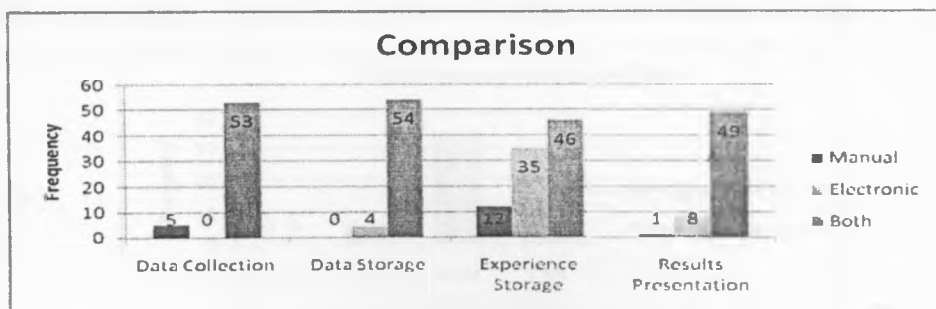
Chart 1: Use of Technology

It was inferred that most respondents preferred to use both manual and electronic modes for these processes.

Thus technology seemed to be used appropriately in the day to day processes of Wildlife Research. What remained to be established was its use in the actual Management of Knowledge.

5.3.12 Computer Skills Rating by Respondents

Rating of Computer Skills	Frequency
Not Good	0
Fair	6
Good	35
Very Good	17

Table 16: Computer Skills Rating

The greater proportion of the respondents was confident at using computers.

5.3.13 Rating of Internet Competence by Respondents

Rating of Internet Competence	Frequency
Not Good	0
Fair	4
Good	35
Very Good	19

Table 17: Internet Competence Level

Most of the respondents used the Internet comfortably for e-mail, Web conferences, and to gather contextual study material. A few used the Internet to share their research findings by contributing articles to e-newsletters. 3 of them attested to having their personal websites where they posted periodic findings for the interested reader.

Comments at Computer and Internet Usage

The chart below represents cumulative skills for Computer and Internet usage.
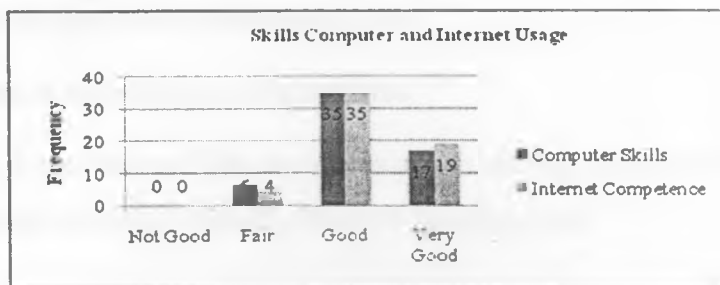
Chart 2: Computer and Internet Skills

It was noticed that the respondents had good skills at using Computers as well as the Internet. Computers were used for personal usage to gather, store and present research Knowledge. What needed to be established thus was the degree of this usage for the purposes of Knowledge Management.

5.3.14 Respondents' Level of Knowledge Collaboration

Research Findings Shared with	Frequency
Colleagues	56
Superiors	51
General Public	50
Other Research Organization	49
Entire Organization	43
Non Research Organization	41
No-one	0
Others	13

Table 18: Research Collaboration
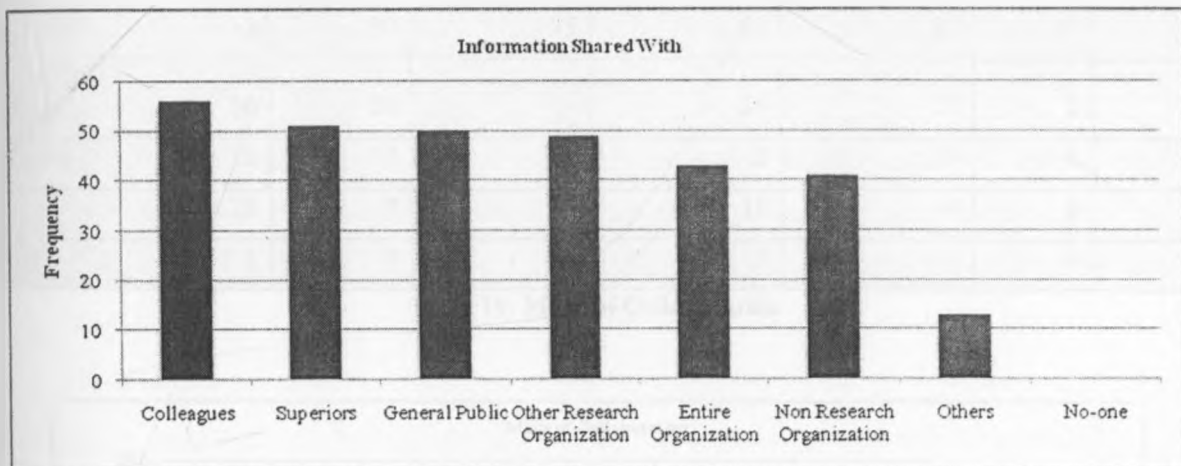
Chart 3: Research Collaboration

All respondents confirmed to share their research information with at least one of the categories tested. Sharing with Colleagues came out to be the highest, followed by sharing with Superiors. Sharing with the other organizations and the General Public was also reported as good. No respondents claimed to share with absolutely no one.

Comments on Level of Knowledge Collaboration

From this analysis, it was inferred that there was active sharing of research findings within the organization. Findings were also shared with other organizations.

What remained to be established was:

- What prompted this sharing?

- Whether the sharing was a personal initiative or through organizational guidelines?

- What mode was used to share these findings?

- How frequent were they actually shared?

This would lead to an evaluation of the extent of Knowledge Management being practiced.

5.3.15 Mode of Knowledge Collaboration

Mode of Sharing	Frequency						
	Colleagues	Superiors	Rest of the Organization	Other Research Organizations	Non Research Organizations	General Public	Cumulative
E-mail	47	47	42	43	39	18	236
Magazines & Periodicals	39	11	32	39	38	40	199
Conferences	37	6	32	39	34	29	177
Face 2 Face	55	30	25	12	12	27	161
Organizational Reports	36	38	14	31	27	3	149
Web Portal	18	17	15	3	3	8	64
Blog	28	7	4	11	4	8	62
None	1	3	4	2	3	4	17

Table 19: Mode of Collaboration

Chart 4: Mode of Collaboration

Analysis revealed that the most preferred mode of collaboration among respondents was by e-mail. Apart from the general public, e-mail was used with all the other collaborators.
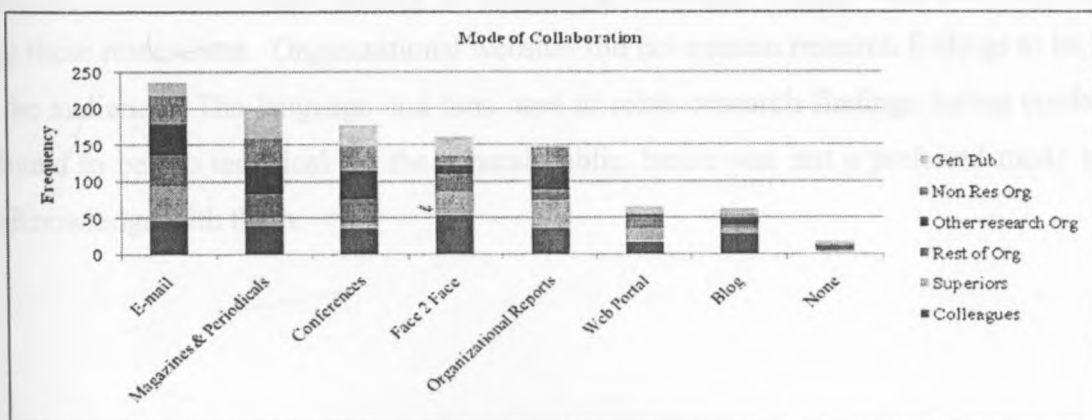
Magazines and periodicals was the second most preferred mode of sharing the research findings.

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Conferences were used as a sharing medium for most of the collaborating partners, except for superiors and the general public. Superiors needed a more personal medium reporting. The language and tone used to relate research findings during conferences was too technical for the general public, hence was not a preferred mode to share with them.

Face to face mode was the highest among colleagues of the same organization. This could take the form of informal and frequent reporting. This mode was the least popular when sharing was with other research or non-research organizations. These collaborating partners preferred written presentations to informal face to face type of sharing.

Organizational reports were employed to share the research findings with all but the general public and the respondents' organization.

Web portals and Blog were recognized as generally the least popular mode of sharing research findings.

Seventeen respondents used other means than the ones suggested, to share their research findings. This comprised class lectures, community workshops, periodic reports to specific stakeholders and also project specific reports for the funding partners.

Comments on Mode of Knowledge Collaboration

The most preferred mode appeared to be through e-mails. It would be difficult to ascertain whether or not these e-mails were archived for future reference in a systematic format. The frequency and distribution of magazines and other periodicals needed to be established. Where organizational portals existed, they were mere hubs for archiving policy documents. They were not actively utilized to effect sharing of research Knowledge. Blogs were not very common among these researchers. Organizational websites did not contain research findings to be shared with the audience. The language and tone used to relate research findings during conferences was found to be too technical for the general public, hence was not a preferred mode used to share Knowledge with them.

5.3.16 Frequency of Knowledge Collaboration by Respondents

	Frequency						
Frequency	Colleagues	Superiors	Rest of the Organization	Other Research Organizations	Non Research Organizations	General Public	Cumulative
Annually	28	30	35	32	28	42	195
Monthly	17	41	35	18	15	11	137
Quarterly	21	9	17	26	20	11	104
Weekly	31	7	5	4	3	3	53
Daily	23	5	4	3	2	2	39
Biannually	0	6	3	4	2	2	17
Never	0	2	4	2	5	3	16

Table 20: Frequency of Collaboration
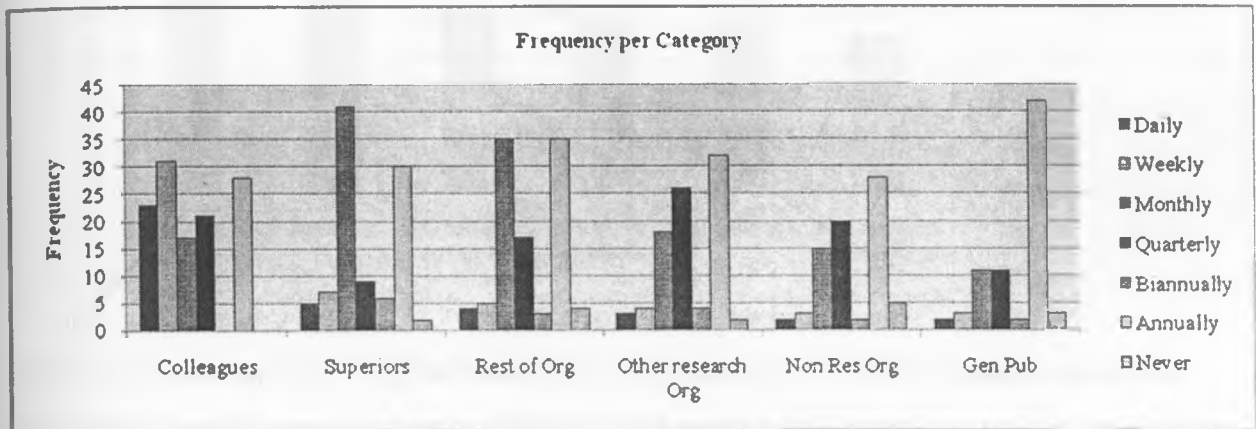
Chart 5: Frequency of Collaboration

Comments on Frequency of Collaboration

Among Colleagues, sharing was dependent on the project needs. It ranged almost equally from daily to annually.

For sharing with superiors most stated a monthly reporting format. The second highest rating was given to annual reporting. However, 2 respondents stated no need of reporting to their superiors.

With the rest of the organization, monthly and annual reporting was rated equally. Some had a quarterly reporting system.

Sharing research findings with the other research as well as non research organizations, annual reporting was the most preferred, followed by quarterly then monthly respectively.

General public got the results of findings mostly once a year.

Other frequency of sharing was needs specific.

5.3.17 Source of Feedback Received by Respondents

Source of Feedback Received	Frequency
Colleagues	52
Superiors	48
Other Research Organization	42
Entire Organization	39
General Public	38
Non Research Organization	35
Others	2
No-one	1

Table 21: Source of Feedback
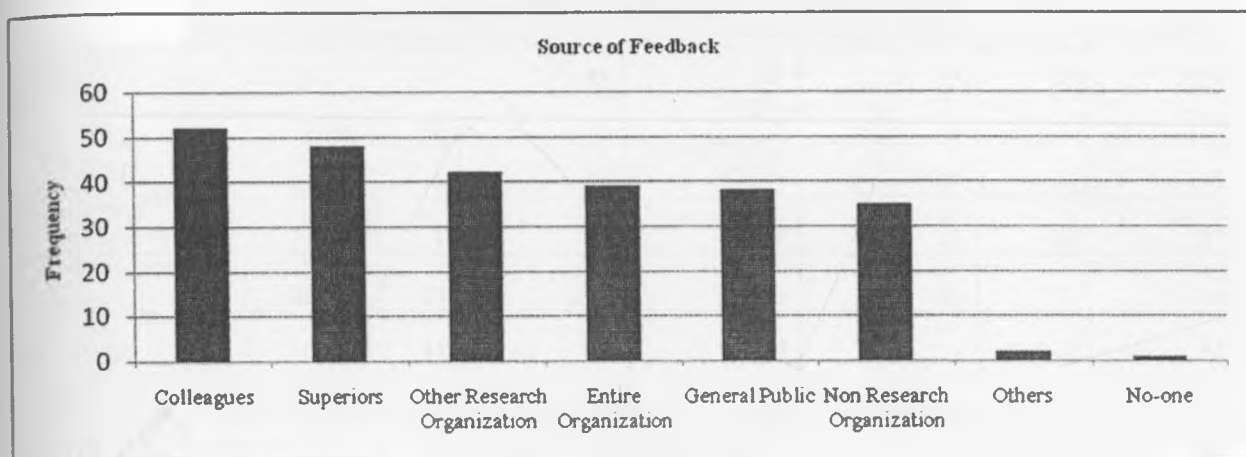
Chart 6: Source of Feedback

Analysis showed that receiving feedback from Colleagues was the most common occurrence. Colleagues shared common research objectives and could even be working on the same project. Thus receiving feedback from them was crucial.

The next highest source of feedback came out as Superiors.

A high proportion of respondents received a feedback from other staff of their organization. Such feedback was possibly received in cases where similar projects were handled by different groups of the same organization, thus making it crucial to provide a feedback.

Sharing with other research and non-research organizations was also evident. This could be as a result of mandatory reporting and feedback dictated by the terms of collaboration and funding issued for research projects.

General public also availed their feedback.

Two respondents received feedback from sources other than the ones tested above. These comprised students, farmers and other specific stakeholders that had requested the research findings. Only one respondent received no feedback for sharing the findings.

Comments on Source of Feedback

Thus it was inferred that feedback was received from a good percentage of the collaborators.

What remained to be evaluated was what led to the sharing and feedback?

Whether or not this sharing and feedback was documented?

Was there Knowledge that was generated as a result of sharing and receiving feedbacks?

5.3.18 Mode of Feedback Received by Respondents

	Colleagues	Superiors	Rest of the Organization	Other Research Organizations	Non Research Organizations	General Public	Cumulative
E-mail	46	47	45	42	39	22	241
Face 2 Face	52	30	21	7	6	22	138
Conferences	24	0	26	29	28	28	135
Magazines & Periodicals	24	1	25	26	25	26	127
Organizational Reports	26	28	4	25	23	0	106
Web Portal	10	11	11	4	2	5	43
Blog	23	6	0	7	1	5	42
None	2	6	5	5	7	6	31

Table 22: Mode of Feedback Received
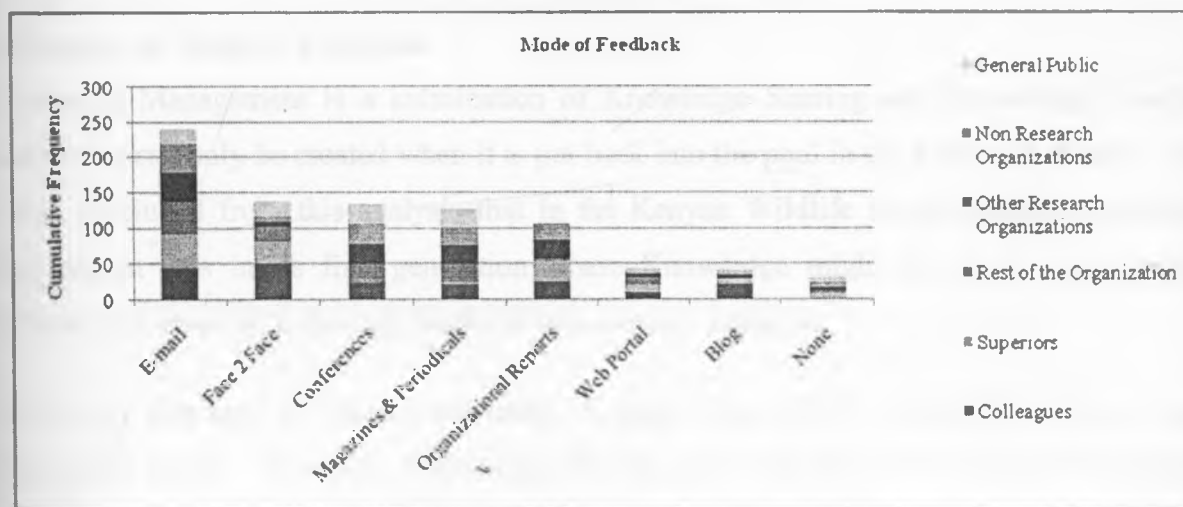
Chart 7: Mode of Feedback received

General public did not prefer e-mail as the preferred mode of feedback. For the rest of the categories tested, e-mail seemed to be the mode of highest preference.

Colleagues preferred to provide a feedback in an informal face 2 face mode. Some superiors and other members within the respondent organization also chose to provide a face 2 face form of fedback in some cases. Other research and non-research organizations chose face to face 2 face mode in very specific cases. For general public face 2 face mode of feedback seemed to be

the preferred one. Generally workshops or open days held for the community people was the gateway to their feedback.

During conferences, all collaborators seemed to provide a feedback. However, only an average of 50% of the respondents communicated this to be the preferred mode of feedback received. The rest of the respondents claimed not to attend conferences and seminars very frequently because of lack of funds. Superiors however, did not use that avenue of feedback.

Formal organizational reports were used equally by colleagues, superiors and other organizations. The rest of the respondents' organization did not give a feedback through these reports. General public also did not write reports to provide feedbacks.

Whereas magazines and periodicals attracted a similarly popular rating, not all respondent organizations could afford the cost of printing and distributing these, thus missed out on this mode of sharing and feedback.

Blogs were used by many to communicate with colleagues. However, using blogs was almost non-existent among the other categories tested.

An average of 10% reported not to use any of these as modes for receiving feedback. There was not much evidence to deduce which other mode could be used.

Comments on Mode of Feedback

Knowledge Management is a culmination of Knowledge Sharing and Knowledge Creation. Knowledge can only be created when it is put back into the pool in the form of feedback. Thus it was concluded from this analysis that in the Kenyan Wildlife research sector Knowledge Management was in its first generation where Knowledge might be shared but receiving opinions and views on it through feedback was not very common.

Technology was used in research activities. E-mails were used by about 70% of the average respondents tested. However, Knowledge Sharing and Generation with the use of Internet, through Web Portals and Blogs, was very poor. It became evident that there was room for improvement.

5.3.19 Frequency of Feedback Received by Respondents

	Colleagues	Superiors	Rest of the Organization	Other Research Organizations	Non Research Organizations	General Public
Annually	26	28	29	17	15	28
Monthly	12	32	28	15	13	6
Quarterly	21	8	15	23	19	10
Weekly	30	5	5	1	1	2
Daily	19	4	4	2	1	2
Never	1	2	3	4	5	3
Biannually	0	6	3	2	2	1

Table 23: Frequency of Feedback
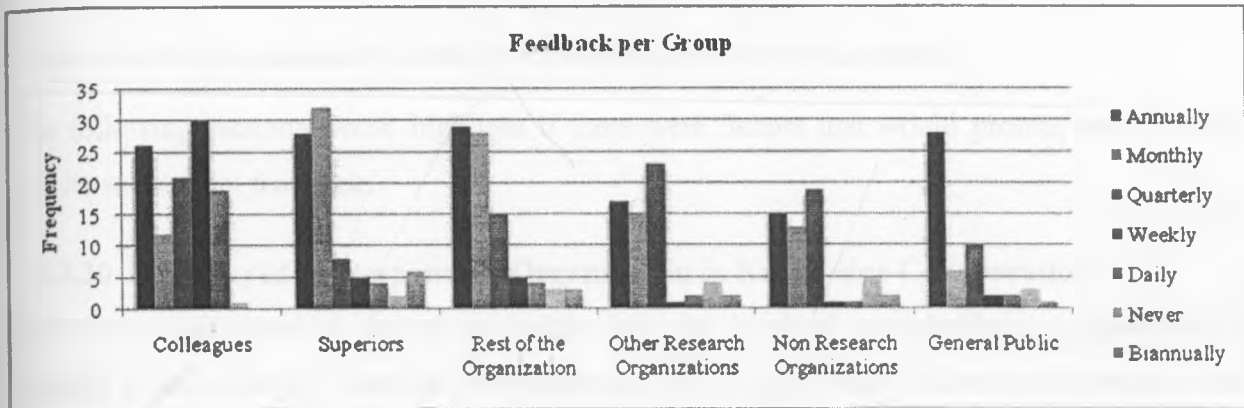
Chart 8: Frequency of Feedback

Colleagues seemed to prefer a weekly feedback format. Annual followed by quarterly was the next preferred choice of feedback. Only 19 attested to a daily feedback. Monthly feedback was the least practiced. One respondent claimed never to receive any feedback.

Superiors seemed to provide a feedback either monthly or daily. The other feedback intervals were rarely practiced.

Most respondents received a feedback from the rest of the organization either annually or monthly. Some preferred the quarterly format. The rest of the intervals were very rarely seen.

Other research and non-research organizations showed a trend of quarterly followed by annually and then monthly format of feedback.

General public was set to provide feedback only once a year. The rest of the intervals were not suited to them.

An average of three respondents claimed to not receive any feedback from at least one category of collaborators.

Five of the respondents affirmed to receiving a feedback depending on the type and the stage of research project accomplished.

Comparison of Sharing with Feedback Received

A cumulative frequency was worked out for all categories of collaborators for the purposes of comparison.

Cumulative Frequencies	Annually	Monthly	Quarterly	Weekly	Daily	Biannually	Never
Sharing	195	137	104	53	39	17	16
Feedback	143	106	96	44	32	14	18

Annual sharing among collaborators was the most preferred, followed by monthly and quarterly respectively. However as is evident by the table above, not all sharing of findings received a 100% feedback.

There was need to establish whether or not the feedback was documented.

The following sections would highlight if there were factors that would prompt better sharing and its subsequent feedback.

5.3.20 Role Played by Respondent Organization in Knowledge Collaboration

Questions were posed to gather an insight into the level of organizational commitment to manage its Knowledge. Through interviews and questionnaires the following information was collected.

Knowledge Management Platform provided by the Respondent Organization	Frequency
Web portals	21
Conferences	20
Meetings	18
Seminars	15
Workshops	14
Periodicals	14
MOU	12
Publications	10
Presentations	6
Organization mandate	6
Reports	5
Blogs	5
Focus groups	2

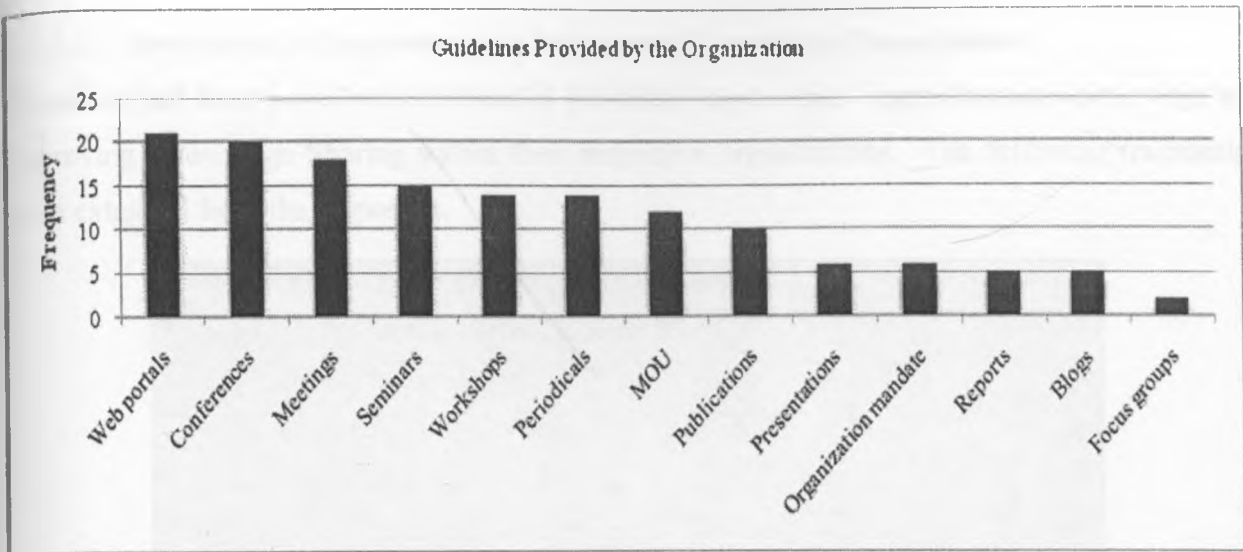Table 24: Knowledge Management Platforms provided by the Organization

Chart 9: Knowledge Management Platforms provided by the Organization

Comments on Organizational Knowledge Sharing Platforms

It was inferred that Web Portals was the most rated option as platform provided by the organization for Knowledge sharing. However, with reference to sections 5.4.15 and 5.4.18, it was noticed that Web Portals were not the preferred choice for sharing research findings or documenting feedbacks among the collaborators. Thus it was an under-utilized resource.

The next preferred sharing platform that was provided by the respondents' organizations used face to face modes like meetings, seminars, conferences and workshops. Knowledge here could be exchanged among various collaborators at the same time. This could prove to be a good platform for Knowledge sharing as well as generation, if used appropriately.

Only 17% used publications to share Knowledge and 24% shared through periodicals. Owing to the fact that this study was conducted on scientific research institutes, it was expected that most respondent institutions would advocate sharing of research findings through publications and periodicals. Thus, there was need to establish why this was not the case on ground.

There was mention of other guidelines such as Memorandum of Understanding, Presentations, Organization mandate, Reports, Blogs and Focus groups too that were used by some respondents' organizations.

5.3.21 Respondent's Suggestions on Improving Knowledge Management

Questions had been posed with the aim of gathering respondents' suggestions towards ways of improving Knowledge Sharing within their respective organizations. The following fragments were extracted from the responses.

Suggestions on Improving Knowledge Management	Frequency
Clear policies to protect Intellectual Property Rights	37
Frequent seminars and workshops	30
Improved funding for up to date technology	26
Improved sharing platforms for researchers	25
Making effective use of Internet for sharing	20
Focused funding and less overlapping of projects	18
Regular updates of web portals	18
Organization transparency on the use of findings by researchers	18
Need for staff incentives	17
Need for right medium of communication	17
Increased use of technology	16
Improved funding towards Knowledge sharing	14
Educating staff on benefits of Knowledge sharing	14
Mandatory repository for past and current research work	13
Motivation to contribute in journals	13
Regular Reporting and feedbacks	12
None	8
Invest in translators to communicate with local communities	7
Improved rapport with colleagues	6
Online reporting	5
Enhanced gateway of open approach to research organizations	5
More leeway to staff in sharing knowledge	4

Table 25: Suggestions to Improve Knowledge Management

It was noticed that responses for suggestions also appeared in the section querying hindrances to Knowledge Management. Thus the analysis was made cumulatitively.

5.3.22 Respondent's Views on Hindrances to Knowledge Management

Respondents identified the following as points that hindered efficient Knowledge Sharing in organizations. These were also extracted as a result of thematic analysis on their textual responses.

Hindrances to Knowledge Management	Frequency
Prohibitive costs of organizing public fora	36
Fear of Intellectual Property theft	35
Cost of publishing findings	29
Lack of effective forum for sharing	26
Lack of common needs	24
Lack of Internet accessibility	23
Lack of clear policies	22
Competition for funding organizations	22
Out dated technology	19
Language barrier	19
Lack of Knowledge sharing culture	18
Lack of proper technical skills	15
Competition among colleagues	12
Organizational politics	7
Hoarding culture	6
Ignorance to the benefits of Knowledge sharing	6
Time gap between research needs and findings	4
Lack of proper translation of scientific data to lay man's understanding	4
Lack of leadership	4

Table 26: Hindrances to Knowledge Management

A pattern of common themes between the two sections was confirmed. After analyzing data on hindrances, it was surmised that the themes identified as hindrances definitely complemented the suggestions for improvement of Knowledge management.

Assumptions

Thus, some common categories in the responses for Suggestions and Hindrances were identified and grouped collectively on the basis of the following assumptions.

   i.   Key words like magazines, periodicals, newsletters, journals, meetings, seminars, workshops and conferences, would be put together and collectively called **Knowledge Sharing Platforms**.

   ii. Responses like policy on Intellectual Property Rights and threats to lose proprietary work would be collectively called **Trust in the System**.

   iii. Costs, funding, funds, expense and investment would collectively be called **Funds**.

iv.   All occurrences of computers, Internet, Portals, electronic devices, technology and technological skills would be collectively referred to as **Technology**.

v.   All responses that mentioned the keywords transparency, hoarding, Knowledge sharing culture, educating the staff, good rapport among staff, effective leadership, policy for Knowledge to be shared freely, and seniors' initiative to provide a feedback for reports, were all grouped under the category **Organization Culture**.

The remainder of the textual occurrences were condensed and re-worded resulting in the categories below.

- Knowledge Sharing Platforms
- Trust in the System
- Funds
- Technology
- Organization Culture
- Medium of Sharing
- Staff Incentives
- Common Objectives
- Accessibility

Owing to the fact that the suggestions provided were specific to the respondents' respective organizations, further research was needed to confirm if these could be applicable to management of Knowledge by all organizations conducting research on Wildlife.

This led to the analysis of questions asked on the Factors that were seen by the respondents as enablers of effective Knowledge Management in any organization.

Alongside this, textual analysis was also performed on the questions aimed at highlighting the pre-conditions necessary to facilitate effective Knowledge Management in any organization.

As a result, the above categories were confirmed to be present in all sections, while yet others were highlighted.

Some categories added were:

- Organization structure
- Knowledge Share Policy
- Knowledge

The table below presents the accumulation of all categories with the frequencies of occurrence in the responses to the respective questions.

5.3.23 Responses categorized

Below is the table for cumulative occurrences of the categories highlighted in Section 5.4.24 as responses to Suggestions, Hindrances, Factors to promote Knowledge sharing as well as the Pre-conditions for effective Knowledge Management.

Categories	Suggestions	Hindrances	Factors	Preconditions	Cumulative Frequencies
Technology	98	57	11	13	179
Organization Culture	54	75	18	15	162
Funds	32	91	7	10	140
Sharing Platforms	55	65	0	0	123
Trust	37	35	26	25	120
Medium of Sharing	24	23	0	9	56
Staff Incentives	30	0	10	16	56
Common Objectives	24	0	7	8	39
Accessibility	5	0	0	0	17
Organization structure	0	0	5	3	15
Knowledge Share Policy	0	0	4	11	8
Knowledge	0	0	0	17	8

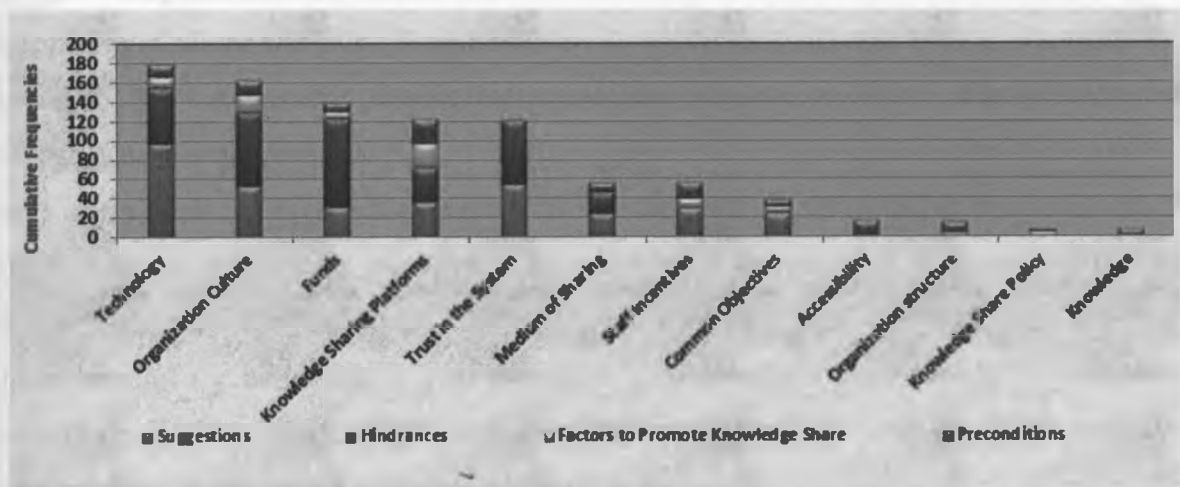**Table 27: Cumulative frequency for Suggestions, Hindrances, Factors and Pre-conditions**

Chart 10: Cumulative frequencies for Suggestions, Hindrances, Factors and Pre-conditions

The interpretation of the accumulated categories is thus presented below.

5.3.24 Interpretation of Cumulative Results

Results of thematic analysis of sections 5.3.21 to 5.3.23 were amalgamated and the following deductions proposed.

i. Infrastructure

Up to date Technology was given the highest cumulative rating in all four sections answered by the respondents.

Knowledge repositories were recommended for effective Knowledge Management.

The type of Knowledge Sharing Platform adopted for collaboration was also rated as crucial to Knowledge Management.

Technology was stated to be utilized in most Sharing Platforms. Computers and the complementing devices were claimed to be used in report writing, production of magazine, newsletters, and journal articles. Technology was suggested to act as the focal point for web-conferences. Internet was said to be crucial for sharing Knowledge through blogs and web-portals.

It was thus inferred that Knowledge Sharing Platforms go hand in hand with appropriate Technology. Hence, the categories Knowledge Sharing Platforms and Technology together were categorized as **Infrastructure**.

> Thus the conceptual framework element **Infrastructure** was confirmed to be crucial.

ii. Organizational Framework

Organization Culture was rated second highest, as per the respondents' views. An organization needed to build a positive sharing culture, in the absence of which efficient Knowledge Management was not realized.

Some respondents believed that Organization Structure was also responsible to either promote or hinder effective Knowledge Management in any organization.   A horizontal Organization Structure was proposed to encourage Knowledge Sharing as compared to a vertical one.

Others were of the belief that a clear Policy on Knowledge sharing stated by the organization helped to promote it. Some respondents asserted that a Knowledge Sharing policy was actually a pre-requisite to effective Knowledge Management.

Other respondents suggested that research organizations needed to be accessible and should make themselves known, thus promoting Knowledge sharing with industry and the general public.

> Thus the collective term used for all these organizational properties that affected the success of Knowledge Management practiced in an organization was **Organizational Framework**. This would be an added element in the validated framework.

iii. Funds

Analysis highlighted that existence of Funds was vital to accomplish Knowledge Management, especially in the Kenyan context.

Funds were needed for any research activity to take place.

Funds were needed to hire skilled and experienced researchers in the field.

Funds were essential for procuring technology that was needed for research.

Funds also played a pivotal role in the disbursement of research findings through any sharing platform used.

> **Funds** were highlighted as a major influence for successful Knowledge Management. Thus **Funds** would be added to the validated framework.

iv. Trust in the System

Fear of theft of Intellectual Property was rated high by at least 60% of the respondents, as being one of the major hindrances to smooth Knowledge Sharing among researchers.

Well formed policies and standards set by the organization to protect individual property rights were seen as a vital factor that would promote Knowledge Sharing.

It was also suggested to be one of the pre-conditions for Knowledge Sharing.

This element was not given much emphasis in the literature studied thus far. It has however, received a lot of weight from the respondents hence, and could be limited to the Kenyan context of Knowledge Management.

> Thus this element was categorized as **Trust in the System** and would form part of the post validation framework.

v. Contextual Knowledge

When Knowledge was suggested by the respondents as the pre-requisite to sharing, they stressed that it needed to be Contextual Knowledge in order to promote sharing.

Only when people had similar interests in a research project would they wish to share their Knowledge and experiences.

> Thus the building block called Knowledge in the conceptual framework would specifically be changed to read **Contextual Knowledge** in the post validation framework.

vi. Miscellaneous Factors

The below mentioned factors were also suggested by a few of the respondents, thus need to be considered.

Medium of Sharing

Some respondents felt that the medium selected to actuate effective Knowledge sharing was also significant. The medium here meant the tone used to share the findings.

The medium also comprised the language in which research findings were presented. The level of technical terminology used in the presentation of results determined who would freely share, understand and thus contribute towards Knowledge Management.

Staff Incentives

Several necessary factors suggested by the respondents such as motivation, rewards, training, recognition, acknowledgement and the like, were collectively grouped under the term staff incentives.

Literature would be studied further to establish the significance of these in effective Knowledge Management.

Common Objectives

It was suggested by the respondents that Knowledge was shared willingly between stakeholders who had common objectives. Researchers with disparate research objectives were not prompted to share their data or findings among themselves.

5.3.25 Final Framework Elements after Categorization

The final elements and their respective cumulative frequencies as a consequence of analysis and assumptions are thus:

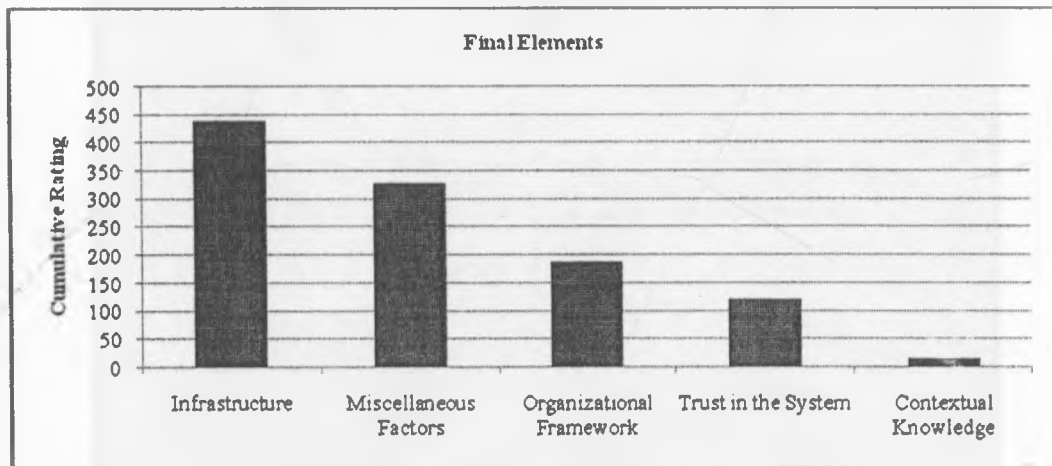| Categories	Suggestions	Hindrances	Factors to Promote Knowledge Sharing	Preconditions
Infrastructure	185	213	18	23
Organizational Framework	59	75	27	29
Trust in the System	37	35	26	25
Contextual Knowledge	0	0	0	17
Miscellaneous Factors	78	23	17	33

Table 28: Categorized Elements

Chart 11: Elements Categorized

The element **Processes** would be added to this list as they utilize all the above elements for actual Knowledge Management to be actuated.

CHAPTER SIX
THE VALIDATED FRAMEWORK

6.1 Elements of the Validated Framework

Knowledge Management is a culmination of interplay among several elements. The illustration below shows these elements and their inter-relation. Individual elements are described subsequently.
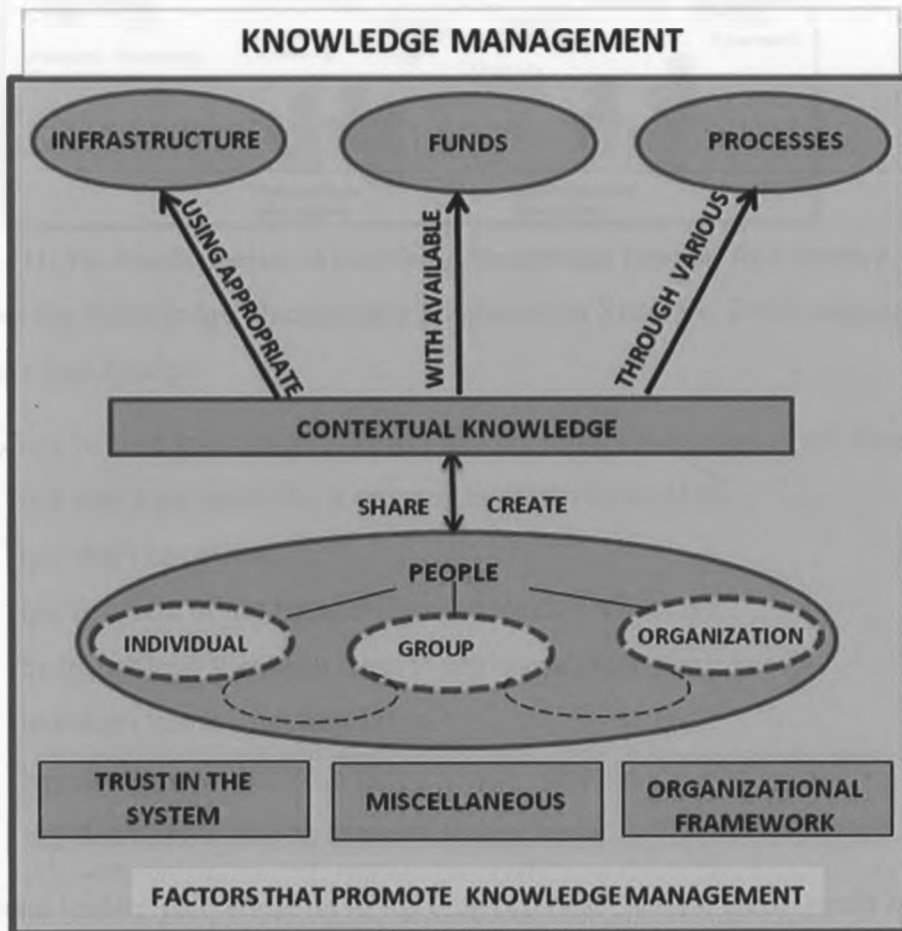

Figure 10: The Validated Framework

6.1.1 People

Individuals share Knowledge among themselves thus forming Groups. Groups further share Knowledge among themselves and form organizations. When sharing brings feedback into the loop, new Knowledge is created. This is collectively represented by the **People** element in the framework.

Sveiby (in Swallow, 2000), admits that managers have sunk billions of dollars into IT programs that have been only marginally successful. Sveiby believes that the major reason for this failure

is that management overlooks the fact that knowledge is embedded in people and knowledge creation occurs during social interaction.
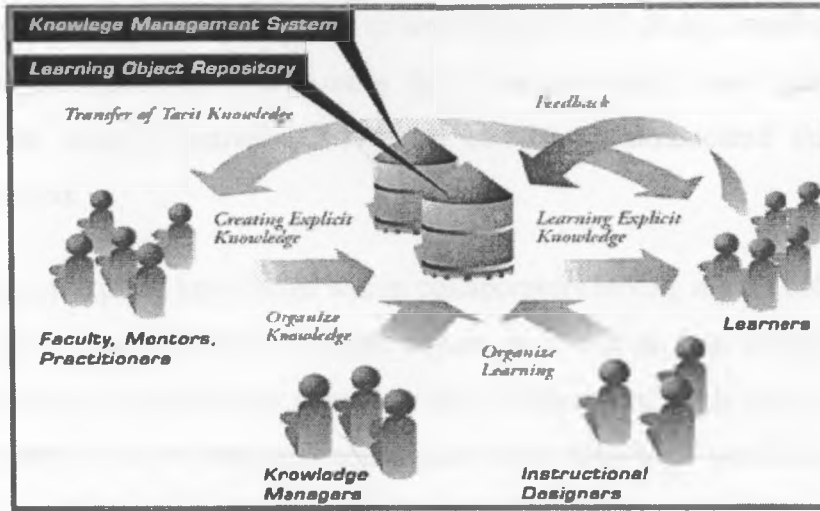

Figure 11: The People Element of Knowledge Management (adapted from Swallow, 2000)

An article from the Knowledge Management Magazine (in Swallow, 2000) explains why people hesitate to share Knowledge:

- They believe knowledge is power and hoarding knowledge is job security.
- They won't get credit for it or won't maintain ownership.
- They don't have time.
- They're afraid of not being right or of making a mistake.
- The technology you want them to use doesn't meet their needs.
- They don't know what they know.
- They don't know that what they know is valuable.
- They don't know how to share what they know.

If organizational leaders paid attention to warding off these factors, there would be a substantial increase in Knowledge Sharing in most organizations. Successful managers aim to empower individuals and workgroups and encourage sharing.

6.1.2 Contextual Knowledge

Knowledge is of value only when it fulfils the context of its use. Sharing knowledge out of context does not help in Knowledge creation. Knowledge can be external, that which is produced by people outside the organization. This type of knowledge resides in books, journals and magazines. Knowledge can also be internal and created primarily within the organization, largely through experience and experimentation.

Generally, the goal of knowledge management within an organization is to manage the internal knowledge of the organization (creation of which uses external knowledge.)

Effective use of information technology to communicate knowledge requires an organization to share an interpretive context. The more that communicators share similar knowledge and experience, the more effectively knowledge can be communicated through electronically mediated channels.

Dissemination of explicit knowledge within collaborators having a high cohesion for contextual knowledge can be accomplished through access to a central Knowledge repository. When interpretive context is moderately shared or the collaborators are loosely affiliated, then more interactive modes such as seminars, conferences and workshops would be appropriate. When context is not well shared and knowledge is primarily tacit, personal face-to-face conversation would be the best mode adopted.

6.1.3   Infrastructure

Appropriate Infrastructure is required for Knowledge to be shared and created among people.

Technology, Tools and Techniques together may be taken as Knowledge Management Infrastructure. This generally utilizes four primary resources:

Repositories of explicit knowledge

Refineries for accumulating, refining, managing, and distributing that knowledge

Organization roles to execute and manage the refining process

Information Technologies to support those repositories and processes

a) The Knowledge Repository

The design of a knowledge repository depends on the two basic components, its structure and content. Knowledge structures provide the context for interpreting accumulated content.

The basic structural element is the knowledge unit. The repository structure also includes the schemes for linking and cross-referencing knowledge units.

A knowledge platform may consist of several repositories, each with a structure appropriate to a particular type of knowledge or content. These repositories may be logically linked to form a composite or "virtual" repository, the content of each providing context for interpreting the content of the others.

b) The Knowledge Refinery

The refinery represents the process for creating and distributing the knowledge contained in the repository. This process consists of five stages:

Acquisition, Refining, Storage and Retrieval, Distribution and Presentation

c) Knowledge Management Roles

Knowledge Management roles comprise cross-functional, cross-organizational processes by which knowledge is created, shared and applied. Organizational roles need to be explicitly defined. These responsibilities typically include championing knowledge management, educating the organization, knowledge mapping, and integrating the organizational and technological resources comprising the knowledge management architecture.

d) Information Technologies

The Information Technology infrastructure should provide a seamless pipeline for the flow of explicit knowledge through all the stages of the refining process.

Information tools such as the World Wide Web and Lotus Notes™ offer a potentially useful environment within which to build a multimedia repository for rich, explicit knowledge.

6.1.4 Processes

Knowledge Management can be achieved through a combination of several processes.

Skyrme (1998) enlists a range of activities that enable Knowledge management:

- Creation of Knowledge databases such as best practices, expert directories, market intelligence.
- Effective information management in terms of information gathering, filtering, classifying, storing.
- Incorporation of Knowledge into business processes.
- Development of Knowledge centres that act as focal points for Knowledge skills and facilitating Knowledge flow.
- Reuse of Knowledge at customer support centres like via the use of case-based reasoning.
- Introduction of collaborative technologies, especially Intranets or groupware, for rapid information access within the organizations.

- Knowledge webs formed of networks of experts who collaborate across and beyond an organization's functional and geographic boundaries.
- Augmentation of decision support processes, such as through expert systems or group decision support systems.

6.1.5 Funds

Funds are needed in all activities taking place in an organization. This element attracts a higher mention when the focus of discussion happens to be in the developing part of the world. In Kenya Wildlife is in abundance but for research to be conducted efficiently, it needs collaboration with funding partners.

For effective data collection, up-to-date technology is needed in the form of Infrared cameras, heat sensing cameras, Global Positioning enabled devices and the like. Outsourced funding enables procurement of these, thus assisting effective data capture. When data is transferred and stored electronically, it can then be shared by several researchers to perform different analysis without the need to re-capture it again. The barriers of time and space can be overcome by availability of funds.

Funds are needed to enable production and disbursement of research findings in the form of reports, magazines, newsletters and publications. Availability of Internet facilities is very crucial for relaying the research data as well as analysis. Access to Internet facilities is yet a costly affair in the remote parts of the country, which is indeed the habitat for the Kenyan Wildlife.

6.1.6 Organizational Framework

Analysis of gathered data confirmed that both Organization Structure and Organizational Culture are significant factors that affect Knowledge sharing within an organization. Organizational Framework is a term given cumulatively to Organizational Structure and Organizational Culture.

a) Organizational Structure

Organizational structure is defined by the arrangement of four elements namely, centralization, formalization, hierarchy, and departmentalization.

i.   **Centralization** is the extent of which decision making authority is concentrated at the highest levels of the organization.

ii. **Formalization** is the degree to which a firm has its policies, procedures, job descriptions, and rules formalized in writing. Whereas formalization provides direction and reduces ambiguity, it may however, reduce employee motivation, innovation, and job satisfaction (Carpenter et al., 1969).

iii. **Hierarchy** is defined by the number of levels that an organization structure has. Vertical structures result in greater opportunities for managers to interact with employees. Conversely, Horizontal structures provide staff more freedom and autonomy (Carpenter et al., 1969).

iv. **Departmentalization** is the process of grouping activities by function or by division. Functional departmentalization is when activities are grouped by function, such as marketing, accounting, or human resources. Divisional departmentalization is when activities are grouped by products, services, or geographical location. Functional departmentalization is more effective when an organization does not have a lot of different products or services and is operating in a stable environment. Divisional departmentalization is more effective for an organization that has a diverse product line or when it is operating in a turbulent environment (Carpenter et al., 1969).

According to Choo (in Sharratt and Usoro, 2003), "organizations with a centralized, bureaucratic management style can stifle the creation of new Knowledge, whereas a flexible, decentralized organizational structure encourages Knowledge-sharing, particularly of Knowledge that is more tacit in nature".

Thus Knowledge is better shared **horizontally** than in a hierarchical organizational set up.

b) Organizational Culture

Sine et al (2006) define organizational culture as a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration. It is considered valid and is therefore, taught to new members as the correct way to perceive, think, and feel in relation to those problems.

Basically, organizational culture is the personality of the organization. Culture is comprised of the assumptions, values, norms and tangible signs of organization members and their behaviours.

Some Types of Culture

The types of organizational Culture as defined by Bruce M. Tharp are:

"Collaborate (Clan)" Culture is an open and friendly place to work where people share a lot of themselves. Leaders are considered to be mentors or even parental figures. Group loyalty and sense of tradition are strong. There is an emphasis on the long-term benefits of human resources development and great importance is given to group cohesion. The organization places a premium on teamwork, participation, and consensus.

"Create (Adhocracy)" Culture is a dynamic, entrepreneurial, and creative place to work. Innovation and risk-taking are embraced by employees and leaders. The long-term emphasis is on growth and acquiring new resources. Individual initiative and freedom are encouraged.

"Control (Hierarchy)" Culture is a highly structured and formal place to work. Rules and procedures govern behaviour. Leaders strive to be good coordinators and organizers who are efficiency-minded. Formal policies are what hold the group together. Stability, performance, and efficient operations are the long-term goals. Management wants security and predictability.

"Compete (Market)" Culture is a results-driven organization focused on job completion. People are competitive and goal-oriented. Long-term focus is on competitive action and achievement of measurable goals and targets. Competitive pricing and market leadership are important.

O'Dell and Grayson (1998) argue that "if the process of sharing and transfer is not inherently rewarding, celebrated, and supported by the organization culture, then artificial rewards won't have much effect".

Thus, a conducive **mix** in organizational culture is vital to promote Knowledge Management.

6.1.7 Trust in the System

Kramer, Tyler (1996) present trust is as a much debated construct. They claim that trust involves a willingness to make one vulnerable to others and involves trust in various facets of another party, namely:

- Trust in their competence
- Trust in their openness and honesty
- Trust in their intensions and concerns
- Trust in their reliability

Therefore, trust comes out as an important facilitator in communication and collaboration.

Nahapiet and Ghoshal (in Sharratt, Abel Usoro, 2003) suggested that trust facilitates transactions and collaboration. This suggests that "where relationships are high in trust, people are more willing to engage in cooperative interaction". Hence, the greater one's perceived integrity and benevolence in a community, the greater one's engagement in Knowledge-sharing.

Ghoshal and Barlett (in Akamavi, Kimble 2005), noted that trust is fundamental to an organization. It is suggested that trust enhances positive behaviour, promotes organizational informal and formal network relations, reduces harmful conflicts, transaction costs and enhances the formulation of informal groups (Meyerson, Weick and Kramer, 1996).

Nonaka and Takeuchi (1995) asserted that if the owner of the Knowledge is not confident or does not trust the seeker of the Knowledge to reciprocate in the near future, they may choose to hoard their valuable tacit Knowledge. Tacit Knowledge requires a lot of effort to be invested by the owner of the Knowledge and the seeker of the Knowledge to enable its flow from one party to the other.

For any Knowledge transfer to take place between a contributor and recipient, the element of trust is crucial. Individuals have to trust that the organization is going to guard their Intellectual Property Rights and that their efforts are going to be well recognized before any Knowledge transfer can take place. The importance of this element has been confirmed through analyzing the responses.

By analyzing the data gathered, the element **Trust in the System** gained the third highest ranking. Thus it was concluded that it is indeed an important factor in effective Knowledge Management.

6.1.8 Supplementary Factors that Promote Knowledge Management

A study was carried out by Bechina and Ndlela (2007), to understand the factors that have generally promoted adoption of Knowledge Management in organizations around the world. These are described below.

Staff Incentives

Knowledge resides within individuals. Therefore, in order to effectively share Knowledge, individuals must be motivated to do so.

It has been argued that the provision of appropriate incentives will most likely influence the behaviour of employees in Knowledge-sharing (Chung 2001).

Hall (in Sharratt , Usoro, 2003) views Knowledge-sharing as a social exchange and argues that to "entice people to share their Knowledge ... actors need to be persuaded that it is worth entering into a transaction in exchange for some kind of resource".

Hall further argues that career advancement is an effective incentive in motivating Knowledge-sharing.

Recognition of efforts motivates people to share their Knowledge willingly.

Knowledge workers are more likely to participate in knowledge management activities if rewarded financially (Chaudhry, 2005)

Medium of Sharing

For individuals to gain from Knowledge sharing activities, the appropriate medium used for sharing is imperative. Researchers being scientists are prone to using technical language while exchanging knowledge with fellow researchers. When the same Knowledge is disseminated at community level, technical terms need to be translated to the local vernacular for it to be effective. Also at community level circulating say, journal articles would trivialize the Knowledge. Thus the tone, language and medium of sharing Knowledge are critical to effective Knowledge sharing.

Common Objectives

For two parties to share Knowledge they need to have common purpose. People conducting research of similar nature will be more inclined to share with each other than with those of disparate nature.

Common objectives augment Knowledge sharing between organizations.

CHAPTER SEVEN
CONCLUSIONS AND RECOMMENDATIONS

7.1 Achievements

The research study was based upon an inadequacy in the reporting protocol followed by the key Government agencies that authorized research on Kenyan Wildlife. Upon evaluation it was revealed that most research Knowledge on Kenyan Wildlife remained un-accessible to the authorities, both during and after the research process was concluded. This resulted in:

- Unintentional duplication of research projects leading to misappropriation of skilled human capital.

- Lack of documented underpinning evidence essential for continuity in future research.

The overall aim of the research study was thus, to develop a Framework for Knowledge Management of Wildlife Research in Kenya that would, upon implementation:

- Advocate timely sharing of research Knowledge among various stakeholders and the authorizing agencies thus avoiding duplication of research.

- Provide documented evidence for extension of future research.

The table below illustrates how specific research objectives were met.

	Research Objectives	How they were achieved
1	To identify existing Knowledge Management Frameworks applicable to Wildlife Research.	Through study of existing Literature in books, Journals and Websites with focus on Knowledge Management in general and, where available, specific to Wildlife research.
2	To establish the maturation level of Knowledge Management of Wildlife Research in Kenya.	Through Interviews held with personnel at NCST, KWS, NMK and other key stakeholders in Kenyan Wildlife Research sector.
3	To develop a conceptual Knowledge Management Framework.	By examining various existing Knowledge Management frameworks.
4	To validate the conceptual Knowledge Management Framework.	Through analysis of data collected. The results confirmed the proposed elements of the conceptual framework and revealed others that were specific to the Kenyan context.
5	To tailor the Conceptual Framework to Knowledge Management of Kenyan Wildlife Research.	Through data interpretation. The key elements that were highlighted as specific to the Kenyan context were incorporated into the conceptual framework thus resulting in the final validated framework for Knowledge Management of Wildlife Research in Kenya.

Table 29: Mapping of Research Objectives onto Progress of Study

The research study has thus far successfully developed a Framework of Knowledge Management for Wildlife Research, tailored to the Kenyan context.

7.2 Additional Elements in the Framework for Knowledge Management of Wildlife Research - tailored to the Kenyan Context

The aim of this study was to develop a higher level framework that would later be utilized for implementation. To enable this, various existing frameworks were studied. A comparison of these frameworks resulted in a few common elements namely, **People**, **Processes**, **Infrastructure**, **Knowledge** and **Supplementary Factors** that promote Knowledge Management. These formed the basis of the Conceptual Framework proposed in Chapter Three.

The Conceptual Framework was tested using a series of Questionnaires and Interviews conducted with researchers from various research institutions within Kenya. Through data analysis various elements that were proposed in the Conceptual Framework were confirmed. However, there were additional elements that were revealed namely, **Availability of Funds**, **Trust in the System** and a **Conducive Organizational Framework**. These were specific to the Kenyan Wildlife Research context.

The additional elements were incorporated into the Conceptual Framework to come up with the final Validated Framework in Chapter Six.

The additional elements have been described below.

7.2.1 Availability of Funds

The interpretation of the gathered data showed that lack of appropriate funding was rated as a crucial deterrent to Knowledge Management of Wildlife Research in Kenya.

Most research in Kenya is funded by external donors. There is hence a lot of competition to secure funds from these organizations. This results in research institutions hoarding their Knowledge, and making it available to the funding organizations only upon request. This is detrimental to Knowledge Management which advocates free, transparent and timely Knowledge collaboration among researchers, thus creating new Knowledge.

Up-to-date technology is needed for Wildlife Research. Funds are essential for procuring this technology.

Funds are also necessary in order to digitize old research findings such that this Knowledge may be shared among various stakeholders.

Upon implementation of the proposed framework, all ongoing research projects would be listed with the authorizing agencies. Funds from the donors can then be converged towards the needed research projects.

7.2.2 Trust in the System

One of the main hindrances to free Knowledge sharing among researchers was an impending fear of theft of their Intellectual Property. Researchers invest an enormous amount of time, effort and money in conducting research. Any indication that their findings would be misused or plagiarized upon sharing, researchers are discouraged to share. It was thus established that if an organization communicated clearly defined policies and standards for the protection of individual property rights, it would greatly enhance Knowledge sharing among its research staff. Although this element did not receive much emphasis in the frameworks studied thus far, it was however, stressed greatly by the respondents of this study. Hence, trust in the system was seen as a fundamental element specific to the Kenyan context of Knowledge Management.

7.2.3 Conducive Organizational Framework

Most of the respondent organizations in Kenya demonstrated a "Compete" Organizational Culture as elaborated in Chapter Six. The effort of individual staff was evaluated by achievement of measurable targets thus making them competitive. Such competitive culture made them hoard their research Knowledge in an attempt to safeguard their positions and potential chance of promotion in the organization. Thus for Knowledge to be shared among research staff of an organization, the management needs to cultivate a Knowledge sharing culture by making its staff team - oriented rather than focusing on individual targets.

Choo (2003) suggested that organizations with a centralized, bureaucratic Organizational Structure could stifle the creation of new Knowledge, particularly of Knowledge that was tacit in nature. This was the case seen in most organizations surveyed, due to the prevalent vertical Organizational Structure. These respondents reported that decisions were effected by certain individuals in the top echelon of management. As a result, the research staff did not receive any acknowledgement for their efforts and it thus, hindered Knowledge sharing among them.

7.3 Limitations

A mix of questionnaires and interviews was used for data gathering. Whereas the success rate of interviews was a 100%, only 32% of questionnaires were returned. This was a major limiting factor to the research study.

With all the advantages of an interview as a preferred mode of data gathering instrument, some respondents maintained caution at revealing organizational shortcomings when queried face to face.

As questionnaires provide anonymity to the respondents they need not restrict themselves from listing such shortcomings. If more questionnaires had been returned, the results of the study would be emphasized better.

7.4 Recommendations for Future Work

The research study had proposed to develop a Knowledge Management framework for Wildlife Research in Kenya, based initially on the following needs of the sector:

- Avoid replication of research in identical areas
- Help continuity of future research

Section 3.8 of the questionnaire was designed to gather the respondents' view on potential benefits of Knowledge Management. The following chart illustrates several of them.
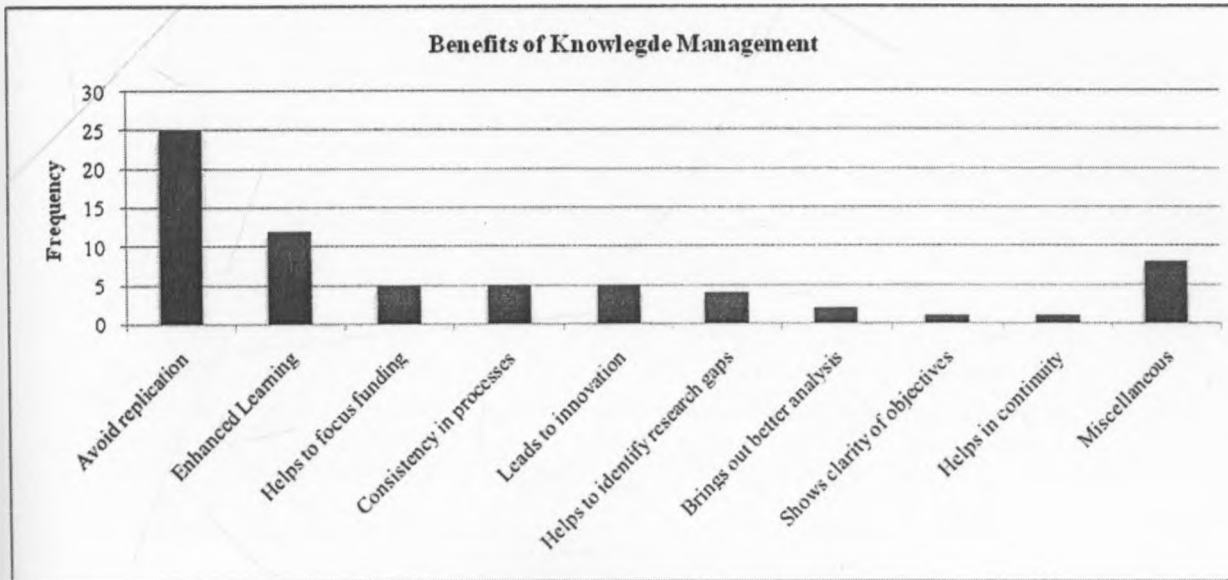
Chart 12: Benefits of Knowledge Management

As is illustrated the proposed framework tends to capture lot more benefits than initially envisaged. Thus to extend the knowledge gained from this research study it is recommended that a Knowledge Management Information System for Wildlife Research in Kenya be developed, based on the proposed framework.

In today's age, Knowledge is Power. Knowledge gained from research findings could be made available to industry at a charge by the authorizing agencies. This could bring in capital to be ploughed back for future research projects.

Crucial research findings when implemented in time could help to safeguard the Wildlife numbers, thus ensuring a sustained growth in the Tourism sector – the second largest earner in the Kenyan economy.

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APPENDIX 2

Questionnaire on Management of
Kenyan Wildlife Research Knowledge

ate _____ (dd/mm/yyyy)   **Serial No.** _____

NTRODUCTION

Anuradha Khoda, am a student taking MSc. Information Systems at the College of Computing, University of Nairobi. I wish conduct this survey in order to facilitate my thesis study, which entails developing **A Framework of Knowledge nagement in Wildlife Research**. My thesis study endeavours to promote awareness of Knowledge Management ecifically, in the research activities conducted on the Kenyan wildlife.

nowledge Management is a set of managerial activities related to the generation, codification and sharing of knowledge. It is systematic process of capturing knowledge, organising it, filtering it and presenting it in a way that improves understanding nong shareholders within the industry.

his survey will assist in evaluating the extent of Knowledge Management adoption in conducting research activities related to e wildlife sector in Kenya. It will help in identifying the challenges that have hindered full adoption of Knowledge anagement both by individuals as well as organizations.

his research is purely academic, and will solely be used for that purpose. Your details or data provided will not be passed nto any third party without your permission. Your response will be highly appreciated and the analysis of this survey will be ade available to any interested respondents.

General Information

1 **Gender**   Male ☐   Female ☐

2 **Age bracket**   25-35 ☐   36-50 ☐   51 & above ☐

3 **Level of Education**   Certificate/Diploma ☐   Bachelor's Degree ☐   Masters Degree ☐   Doctoral Degree ☐

4 **Nature of Organization**
(You may tick more than one)   Research Organization ☐   University ☐   Government Institution ☐

5 **Sponsorship**   Individual ☐   Research Organization ☐   University ☐   Company ☐

6 **Category of Research** (You may tick more than one)

Biodiversity Information Management ☐   Ecological Monitoring ☐   Human Wildlife Conflict ☐

Species Monitoring ☐   Veterinary / Biomedical ☐

Others ☐   Please elaborate _____

7 **Where in Kenya do you conduct your research?**

_____

8 **Your research experience in years?**

Between 1 and 5 ☐   Between 6 and 10 ☐   More than 10 ☐

Technology Adoption

1 **What methods do you adopt to Gather your research data?**

Manual ☐   Electronic ☐   Both ☐

2 **What methods do you adopt to Store your research data?**

Manual ☐   Electronic ☐   Both ☐

3 **What methods do you adopt to Store your research experience?**

In the head ☐   Documented Manually ☐   Documented Electronically ☐

4 **What methods do you adopt to Present your research data?**

Manual ☐   Electronic ☐   Both ☐

5 **How would you rate your computer literacy skills?**

Not Good ☐   Fair ☐   Good ☐   Very Good ☐

6 **How would you rate your Internet competence level?**

Not Good ☐   Fair ☐   Good ☐   Very Good ☐

1

Knowledge Management

1 Whom do you share your research information with? (You may tick more than one)

Colleagues ☐   Superiors ☐   Entire Organization ☐   Other Research Organizations ☐

Non-Research Organizations ☐   General Public ☐   No-one ☐

Others ☐ Please elaborate

2 What is your mode of sharing this information? (You may select more than one option in each category)

Colleagues	Face to Face ☐	Intranet Portal ☐	E-mail ☐	Blog ☐	Magazines / Periodicals ☐
			Organizational Reports ☐	Conferences ☐	None ☐
Superiors	Face to Face ☐	Intranet Portal ☐	E-mail ☐	Blog ☐	Magazines / Periodicals ☐
			Organizational Reports ☐	Conferences ☐	None ☐
Entire Organization	Face to Face ☐	Intranet Portal ☐	E-mail ☐	Blog ☐	Magazines / Periodicals ☐
			Organizational Reports ☐	Conferences ☐	None ☐
Other Research Organizations	Face to Face ☐	Intranet Portal ☐	E-mail ☐	Blog ☐	Magazines / Periodicals ☐
			Organizational Reports ☐	Conferences ☐	None ☐
Non-Research Organizations	Face to Face ☐	Intranet Portal ☐	E-mail ☐	Blog ☐	Magazines / Periodicals ☐
			Organizational Reports ☐	Conferences ☐	None ☐
General Public	Face to Face ☐	Intranet Portal ☐	E-mail ☐	Blog ☐	Magazines / Periodicals ☐
			Organizational Reports ☐	Conferences ☐	None ☐

No-one ☐   Others ☐ Please elaborate

3 What is the frequency of sharing this information? (You may select more than one option in each category)

Colleagues	Daily ☐	Weekly ☐	Monthly ☐	Annually ☐	Never ☐
Superiors	Daily ☐	Weekly ☐	Monthly ☐	Annually ☐	Never ☐
Entire Organization	Daily ☐	Weekly ☐	Monthly ☐	Annually ☐	Never ☐
Other Research Organizations	Daily ☐	Weekly ☐	Monthly ☐	Annually ☐	Never ☐
Non-Research Organizations	Daily ☐	Weekly ☐	Monthly ☐	Annually ☐	Never ☐
General Public	Daily ☐	Weekly ☐	Monthly ☐	Annually ☐	Never ☐

No-one ☐   Others ☐ Please elaborate

4 From whom do you receive a feedback upon sharing such information? (You may tick more than one)

Colleagues ☐   Superiors ☐   Rest of the Organization ☐   Other Research Organizations ☐

          Non-Research Organizations ☐   General Public ☐

No-one ☐   Others ☐   Please elaborate

---

5 What is the mode of feedback, if any?   (You may select more than one option in each category)

Category	Face to Face	Intranet Portal	E-mail	Blog	Magazines / Periodicals		Organizational Reports	Conferences	None
Colleagues	☐	☐	☐	☐	☐		☐	☐	☐
Superiors	☐	☐	☐	☐	☐		☐	☐	☐
Rest of the Organization	☐	☐	☐	☐	☐		☐	☐	☐
Other Research Organizations	☐	☐	☐	☐	☐		☐	☐	☐
Non-Research Organizations	☐	☐	☐	☐	☐		☐	☐	☐
General Public	☐	☐	☐	☐	☐		☐	☐	☐

No-one ☐   Others ☐   Please elaborate

---

6 What is the frequency of feedback, if any?   (You may select more than one option in each category)

Category	Daily	Weekly	Monthly	Annually	Never
Colleagues	☐	☐	☐	☐	☐
Superiors	☐	☐	☐	☐	☐
Entire Organization	☐	☐	☐	☐	☐
Other research organizations	☐	☐	☐	☐	☐
Non-research Organizations	☐	☐	☐	☐	☐
General Public	☐	☐	☐	☐	☐

No-one ☐   Others ☐   Please elaborate

7 What platform does your organization provide for sharing research knowledge? Here Knowledge is used as a combined term for research information as well as experience.
Please indicate all possible rules, guidelines, policies, frameworks, memorandum of understanding, community of practice, knowledge bases, intranet portals, forums, blogs, and any other form of sharing platform that is provided.

8 What do you find are the benefits of sharing knowledge for an individual and for the organization at large?

4

.9   What are your suggestions towards improving knowledge sharing in your organization?

Your Opinion

.1   Have you heard of any organization in Kenya that has successfully adopted Knowledge Management?

Yes ☐   No ☐

If Yes, please provide the name

.2   What do you think are the common factors that would promote knowledge sharing in any organization?

.3   What according to you are the common hindrances of knowledge sharing ?

.4   What do you consider as the common pre-conditions for knowledge sharing?

.5   What according to you, are the common benefits of Knowledge sharing?

Thank you for your valued response

Name of Respondent: _____   (Optional)

Name of Organization: _____   (Optional)