DEVELOPMENT OF A CIVIL SERVICE STAFF PENSIONS MANAGEMENT SYSTEM IN KENYA

By

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DECLARATION

DECLARATION BY CANDIDATE

This thesis is my original work and has not been presented for a degree in any other University.

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This thesis is dedicated to my parents, Christopher Opiyo Ogutu and Mama Margaret Agwanda Opiyo, who introduced me to the joy of reading from birth, enabling such a study to take place today.

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ABSTRACT

The field of Information and Communication Technology (ICT) is changing fast in the world economy and is seen as the key driver for change in the operations of many organizations. Studies have shown that organizations that have successfully transformed their operations and corporate image are those that have adopted the use of ICTs in their operations. This study sought to investigate the use of ICTs for efficient management of Civil Service Staff Pension Scheme in Kenya (CSSPS) with a view to develop an Enterprise Resource Planning (ERP) System. In order to achieve the purpose of this study, six specific research objectives were addressed: to establish how CSSPS are managed in Kenya, to determine the extent of integration of ICT in the management of CSSPS in Kenya, to establish the usage of ICTs on enhancement of service delivery in Pensions Department and disbursement of pensions, to establish the role of ICTs in enhancing the security of Pensions Systems, to establish the challenges of managing pensions schemes in Kenya and provide solutions to them and to develop an Enterprise Resource Planning (ERP) model (ICT Solution Prototype) for the management of CSSPS. The study adopted descriptive survey design involving both qualitative and quantitative techniques. The study targeted a population of 220 members of staff drawn from Management Staff, Retirement Benefits Determination Staff, Pensions Accounting and Payroll Staff, ICT Staff, Records Management Staff and Customer Care Staff. The researcher used purposive sampling to pick 68 respondents for the study sample size. The data for this study was collected from primary and secondary sources. The research tools used included; questionnaire, and interview. The study ran in two stages: the pilot stage, followed by the main study. The data from the research instruments were statistically analyzed and SSADM used to model the system. The results of the findings from the statistical analysis indicate that staff have had basic ICT training and have computers although they do not use them for offering pensions services. Regarding respondents perceptions of the usage of ICTs on enhancement of service delivery in Pensions Department and disbursement of pensions, the study established a majority acceptance of the usage of ICTs in order to enhance of service delivery of civil service staff pension scheme. Furthermore, on the role of ICTs in enhancing the security of Pensions Systems, the study established that most of the respondents show the need to use ICT to enhance security of Pensions payment while SSADM led to the development of CSSPS ERP. The study identified challenges that included: existence of multiple disintegrated legacy systems having manual interfaces thus resulting in errors in pensions calculations, loss of records due to lack of storage making retrieval of information difficult, poor ICT infrastructure, financial constraints as the main challenge hindering the effective use of ICTS for efficient CSSPS management. The study will help public service management to deal with the challenges facing their Civil Service Staff Pension Scheme in Kenya. The result of the study will help to further develop appropriate ICT systems.

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LIST OF ABBREVIATIONS

ANSI	–	American National Standards Institute
CCTV	-	Closed Circuit Television
CMM	–	Capability Maturity Model
CPU	–	Central Processing Unit
CSPS	-	Civil Service Pension Scheme
CSSPS	–	Civil Service Staff Pension System
CSSPS	–	Civil Service Staff Pension Scheme
DB	-	Defined Benefits
DC	-	Defined Contributions
DFD	–	Data Flow Diagrams
EIS	-	Enterprise Information System
ERD	–	Entity Relationship Diagram
ERD	–	Entity Relationship Modeling
FOSS	–	Free and Open Source Society
FOSS	-	Free and open Source Software
G2B	–	Government to Business
G2C	–	Government to Customer
G2E	–	Government to Employees
G2G	–	Government to Government
GOK	–	Government of Kenya
ICT	–	Information and Communication Technology
IIS	-	Internet Information Server
IRS	-	Individual Retirement Scheme
IS	–	Information System
ISO	–	International Standards Organization
LAN	–	Local Area Network
MOF	–	Ministry of Finance
NOC	-	Network Operations Center
NSSF	-	National Social Security Fund
ORS	-	Occupational Retirement Scheme
PAYG	-	Pay As You Go
RBA	–	Retirements Benefits Authority
RDBMS	–	Relational Database Management System
SDLC	–	System Development Life Cycle
SMS	-	Short Message Service
SQL	–	Structured Query Language
SSADM	–	Structured Systems Analysis and Design Methodology
UML	–	Unified Modeling Language
WAN	–	Wide Area Network
WWW	–	World Wide Web

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter discusses background information to the study. It provides an overview of the use of ICTs in civil service pensions for records management in Kenya. The chapter also provides statement of the problem, study area, aims and objectives, research questions, justification and significance of the study. In addition it also highlights the scope, limitations/delimitations, the definition of operational terms used in the study and organization of the thesis.

1.1 Background Information

1.1.1Global Perspectives of Pensions Management

According to the World Bank (2012), global pensions systems and reforms since the early 1990s have changed markedly over time; the most recent reassessment is triggered by the ongoing financial crisis and its implications for funded and unfunded pensions.

The World Bank 2012 Report further states that after the fall of the Iron Curtain and the move in Central and Eastern Europe from central planning to market economies, the future for pensions systems for some experts and policy makers appeared bright and fairly certain once the initial crisis was overcome. There was a move of transferring main parts of retirement income from the public sector in order to:- (i) address fiscal unsustainability and projected further population aging and (ii) accelerate financial market development was expected to trigger economic growth to co-finance some of the transition costs. The policy vision emerged from many

sources:- the successful Chilean pension reform and similar reform attempts in Latin America; the seminal 1994 World Bank publication that proposed a multi-pillar pension scheme with a significant shift from publicly managed unfunded defined benefit (DB) schemes to privately managed fully funded defined contribution (DC) schemes; and general enthusiasm and optimism for more market and financial intermediation instead of public intervention. Many countries have been putting reforms in place to focus on this policy vision (World Bank, 1994).

1.1.2 National Perspectives of Pensions Management

Pensions Industry in the Republic of Kenya is governed by Retirement Benefits Authority Act, 1997 and the Pensions Act CAP 189 (Ministry of Finance 2008). According to this Act, Pensions schemes are categorized into four main categories namely: - Civil Service Staff Pensions Scheme (CSSPS); National Social Security Fund (NSSF); Occupational Staff Retirement Benefits Scheme; and Individual Retirement Benefits Scheme. All these schemes apart from the Civil Service Staff Pensions Scheme (CSSPS) are managed by the Retirement Benefits Authority (RBA) and are contributory. The table below shows the categories of pension's schemes and their relationship with the legal structure, membership, funding and regulation.

Table 1: Kenya Retirement Benefits Industry

	Civil Service Scheme	**National Social Security Fund**	**Occupational Schemes**	**Individual Schemes**
Legal Structure	Act of Parliament	Act of Parliament	Trust Deed	Trust Deed
Membership	All Civil Servants	Formal Sector Workers in Companies with 5 and above employees	Formal Sector Workers in Companies that have schemes funded	Individuals formal/informal sector join voluntarily
Funding	Non contributory	Contributory	Contributory	Contributory
Regulation	Exempt from RBA	Subject to RBA	Subject to RBA	Subject to RBA

Adopted from Odundo, 2003

According to a research done by Retirement Benefits Authority (Nation, 2008) the pension's penetration in Kenya stands at 15 per cent of the average seven million formally employed Kenyans. It also indicates further that, the penetration rate within the informal sector is negligible, according to National Social Security Fund statistics.

The Pensions Act (2007) mandated RBA to regulate and supervise the establishment and management of retirement benefits schemes in order to:- protect the interest of members and sponsors of retirement benefits schemes; promote the development of the retirement benefits industry; and implement all government policies relating to the management of retirement benefits. This Pensions Act became effective from 8th January 1999.

Pension fund systems in Kenya were first put in place after independence in 1963. The first post independent pension fund body, the National Social Security Fund (NSSF), was established in 1965 (RBA 2000). Prior to reforms, the pension fund

system provided for benefits once a worker retired on attaining the mandatory retirement age of 55 (RBA, 2006). The guarantee was fixed as the worker's full basic salary throughout his life or that of the widow as the law did not envisage a situation where the wife would support the husband. This law was embodied in the NSSF Act and the Pensions Act (Cap 189).

The pension fund system in Kenya has been supervised by the independent Retirement Benefits Authority (RBA) since 2000, which oversees the 1997 RBA Act that brought about regulation, protection and structure to the pension fund industry. The RBA continues working to develop the industry and advise the government on pension policy reforms. Kenya's pension fund system embraces four components namely the NSSF, Civil Servants Pension Scheme (CSPS), Occupational Retirement Schemes (ORS) and Individual Retirement Schemes.

a) Civil Servants Pension Scheme (CSPS)

The CSPS covers civil servants, judiciary employees, military personnel, armed forces, teachers and parliamentarians (Kakwani et al.,2006). The scheme provides benefits including old age pension, injury and compensation, widows and children pension benefits, dependency pension for 5 years after death of a pensioner, disability pension (military only) and gratuities in the form of lump sums. The CSPS had 200,000 members running in payroll by December 2011 and the government expenditure amount to Ksh. 26.5 billion (National Budget, June 2011) .This systems is a Defined Benefit (DB) scheme and is also referred to as Pay As You Go (PAYG).

CSPS is currently a defined benefits scheme where all the pensions' costs are met by the Government; however, reforms are being undertaken to make it contributory to reduce the fiscal burden on the Government (The Public Service Superannuation

Scheme Bill, 2011). The development of funded public pension systems reduces government expenditure on the Pay As You Go (PAYG) pension systems (Stewart and Yermo 2009:6) thereby directing the funds to other uses. The reform of unsustainable PAYG pension systems can help reduce the fiscal burden that such a system places on the population and indeed avoid burdening the future generations since pensioners will be paid based on what they have contributed in addition to their employer's shares (Stewart and Yermo 2009). Therefore this study makes the linkage between, Civil Servants Pension Scheme (CSPS) and ICT. Hence for the purpose of the current study, Kenya's pension fund system embraces four components namely the NSSF, Civil Servants Pension Scheme (CSPS), Occupational Retirement Schemes (ORS) and Individual Retirement Schemes.

b) National Social Security Fund (NSSF)

The NSSF in Kenya is a public provident fund (pays benefits as a lump sum) that covers members in both the formal and informal sectors (Stewart and Yermo 2009:18). The NSSF contributions are mandatory for employees in firms with 5 or more employees, whereby members contribute 5% of their monthly earnings subject to a maximum of Ksh. 200 that is matched by an equal contribution by the employer (Stewart and Yermo 2009). According to the Kenyan RBA, the employees are allowed to contribute more on voluntary basis to a maximum of Ksh. 1,000 per month. The old-age pension benefits are available to those aged 55 who have retired from active employment (Stewart and Yermo 2009).

c) Occupational Retirement Schemes (ORS)

Occupational retirement schemes (ORS) were established by employers to act as vehicles for accumulation of retirement savings for the employees (RBA 2000). The

ORS can be operated on defined benefit or on Defined Contribution (DC) ideologies but in Kenya the defined contribution is the predominant design (RBA 2008). Although there is no compulsion for employers to set up the ORS, once established, the fund falls under the mandate of the Retirement Benefits Authority and must comply with the laid down regulations.

d) Individual Retirement Schemes (IRS)

Individual retirement schemes (IRS) are run by financial institutions mainly insurance companies which provide an avenue for saving where employers do not have their own schemes, and for workers who wish to make additional voluntary contributions (RBA 2009). By the close of 2009, RBA had registered 24 21 IRS that covered an estimated 2% of the working population. RBA (2009) points out the gap filled by the IRS where the number of employees is so small forming an ORS would not be financially viable.

1.1.3 Pensions Department

The provision and management of retirement benefits for public service employees is governed under a Pensions Act and Regulations. Certain provisions of the Constitution of Kenya are also relevant especially in the context of considering reform options for the current arrangements.

According to the Pensions Department Service Charter Ministry of Finance (2009), CSSPS is managed by Pensions Act CAP 189 which became effective on 8th May, 1942 and which together with other related Acts listed in item(b) below mandates the Pensions Department to carry out the following activities:-

a) Processing and payment of pensions, death gratuities and other benefits to retired, deceased or terminated officers in the Public Service as well as their dependants and legal representatives. This includes former East African Community personnel and those with mixed service including an aspect of Local Government or other public service employment;

b) Implementation and periodic review of the Pensions Acts - Cap 189 (Main Act) & Caps 190, 191, 192, 193, 194, 195, 196, 199, the Service Commissions Act Cap. 185, the Constitution, other Statutes and also the Civil Service Code of Regulations as it relates to Pensions;

c) Advise the Government on the Public Service pensions policy;

d) Provide Pensioner Care Services to retired officers and their families on Government pension policy and the administration of their pensions.

e) Create awareness and provide education on matters relating to Government Pensions

The Department has a workforce of 200 officers who process and maintain more than 500,000 pensioners' files. There are about 200,000 pensioners in the monthly payroll which is maintained by the department. The number of pensioners is growing at an approximate rate of 20,000 annually (Pensions Performance Report, 2009). This scenario is increasingly becoming a burden to the Department in terms of human resource required to handle the work, office space to store the increasing number of files and budgetary requirement which according to the information in the Draft Budget Estimates for the financial year 2009/2010 stands at 26 billion to finance the pension payment.

1.1.3.1 Organization of the Department

Pensions Department which manages pensions and pensioners payroll for all Government organisations is organized into the following Divisions: - Claims Division, Registry Division, Assessment Division, Directorate, ICT Division, Accounts Division and Payroll Division. The department also interacts with external organizations such as the Ministries/Departments, Financial Institutions/Banks, and Kenya National Audit Office (KENAO) in performing its duties (Ministry of Finance, 2010).
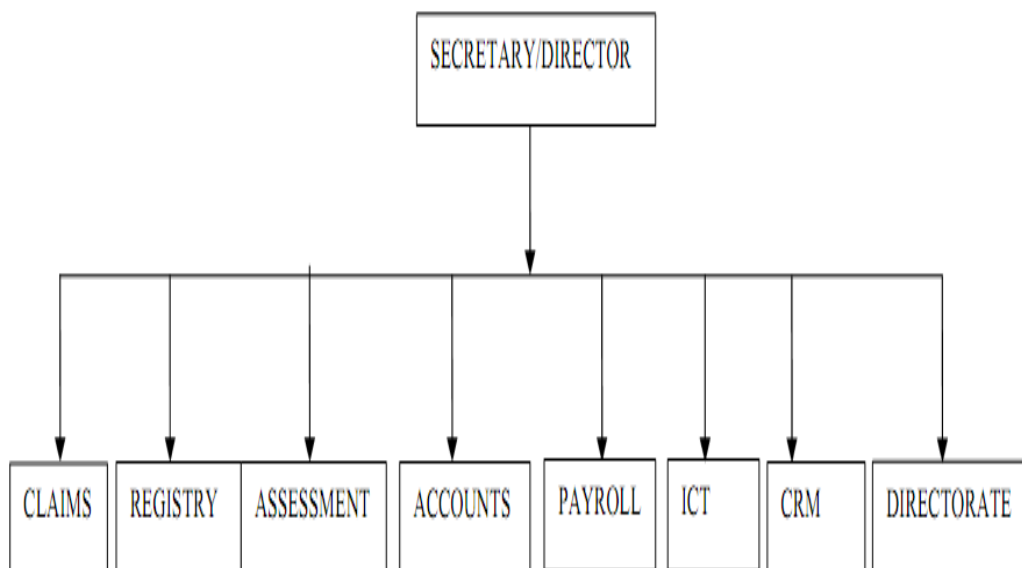
Chapter 1: Figure 1 : Chart depicts the organization of the department.

Claims Division - This division receives all pensions claim forms from the Ministries/Department and vets them before pensions processing is done.

Registry Division - This division is responsible for the management of all records in the department. It ensures that all pensions' files are kept safely and available for processing of pensions. This division also monitors the movement of files in the

department and ensures that files are forwarded to various Divisions. The records stored in this division are largely in physical format and not digitized.

Assessment Division - This is the division in charge of pension's assessment or retirement benefits determination. It ensures that pension's calculations are done correctly and according to the respective pensions act.

Accounts Division - This division ensures that all pensions' claims that have been approved are paid. It also ensures that all bank reconciliations are done and all books of accounts are kept according to the accounting principles and financial regulations.

Payroll Division - This is the division that maintains pensioners' monthly payroll. It ensures that pensioners' payment details are correct and money is transmitted to them every month.

ICT Division - This is the division that provides ICT support in pensions processing. It also ensures that the ICT infrastructure is in place and functioning.

CRM Division − Customer Relationship Management is the division that deals with all customer queries and customer care.

Directorate - This constitutes the management of the department and is responsible for the approval of all pensions' payments.

Audit - This division consists of External and Internal Audit. They carry out audit on all the pensions paid. This division is not included in the organization chart since its mandate is to carry out an oversight roll and it does not get involved the functional activities under the Director, Pensions Department.

1.1.4 Use of ICTs in Pensions Department

Over the past decade, many traditional business practices have faced a myriad of challenges for instance:- rapid market changes such as e-Commerce, e-Government, deregulation, globalization, need for efficient and reliable service delivery and increased competition. These have led to a business environment that is constantly evolving while traditional information systems (IS) continue to serve business needs such as coordination of products and enhancement of services offered, a new and important role has emerged that entails the integration of Information and Communication Technologies in business to an extent that ICT is now positioned in most organizations as a strategic resource that enables automation, analysis, monitoring and coordination to support transformation of business processes and reforms in an organization (Barrios and Nurcan, 2004).

It is therefore imperative that Pensions Department effectively integrates ICT in its management of CSSPS so as to remain competitive and relevant in its service delivery. Furthermore, ICT also provides better ways of improving the interface between the organization and its clients and this is a very important aspect that can be exploited by CSSPS management. ICT has become an integral part of business organizations and more so the ones that are transforming their mode of operations to improve service delivery. Foremost among the drivers of change in this century are the tremendous technological changes. The technological trends that have moved us from one paradigm to another have been those that make communication faster, shorter and cheaper. In addition, there have been continual improvements of communication and data processing at the production, distribution and reception stages. Transistors, microprocessors, microwaves, lasers and even fiber optics have all contributed to these advances (National Research Council, 1995).

It can therefore be concluded that improving the management of CSSPS needs adoption of ICT. The challenges facing Pensions Department which include pensioners' information needs; business processes; and delays in pensions disbursements be thoroughly analyzed to find out how ICT can be integrated in the management of the pensions. So far the Government of Kenya has embarked on provision of services through Huduma Center – eHuduma where pensions is one of the services listed. Initially, the Government is offering the following services in the first Huduma Centre at Teleposta Ground Floor: Renewal of Drivers licenses and Status check; Duplicate National Identity Card; NHIF Registration and Claims ; NHIF Member Statements and accredited Institutions; Assessment and Payment of Stamp Duty – Lands; Nairobi City Single Business Permit; Issuance of Seasonal NCC tickets; Search and Registration of Business Names; Registration of Welfare Groups; PPOA Filing reviews and /or addressing complaints in procurement and disposal; Student Loan Application – HELB; Student Loan Repayment Services – HELB; NSSF Registration; NSSF Member Statements and Benefits; Reporting Corruption – EACC; EACC Clearance Certificate; Status of Pension Claims; Kenya Police Abstract; Community Policing- Nyumba Kumi; Public Complaints through the Commission on Administrative Justice – Ombudsman (www.hudumakenya.go.ke).

The use of Integrated Financial Management Information System (IFMIS) which is an ERP designed for effective financial management has been successful in Kenya in improving service delivery. It is therefore necessary to analyze how ERP will be used to enhance service delivery in Kenya with a view to designing and developing one.

Roman Kay, (2009) states that typical benefits from organizations that implement an ERP system include:- enhanced technology for the organization, improved efficiency

in processes by labour intensive manual processes, integrated and consistent information hence replacing multiple and disconnected data sources, easier reporting, user friendly system, access to Data thus providing real time data, ability to provide better customer Service, increased functionality-robust, better communication across the organization thus promoting collaboration ,increased security of data thus improving data integrity.

1.2 Problem Statement

A report by Kenya Anti-Corruption Commission of Kenya on the examination into the systems, policies procedures and practices of the pensions department Ministry of Finance revealed a number of problems in pension's management Kenya Anti-Corruption, (2008).

General observation of the departmental business processes and preliminary review of the systems suggest that there are problems in the management of CSSPS in Kenya. The problems relate to lack of mechanism to facilitate secure pensions claims processing and disbursement leading to loss of pensioners' benefits through fraud and/or misrepresentation. Also, large volume of manual files that require a bigger office space for storage causes disorganization in the filing system and consequently leads into delays in retrieval of files, misplacement and even loss of files or data.

Although the department has been automating some of its services it was found out that the existing information systems in the department are disintegrated and lack interfaces with other systems that they share data with and thus leading to a number of manual human interventions between the legacy systems consequently creating room for data manipulation. This manual manipulation affects the integrity of data and therefore leads to misappropriation of pensioners' payments.

The large number of pensioners moving into the department to seek information on the status of their pensions payment and the number of hours or days they spend waiting to get simple answers to their queries shows that the department is lacking in effective customer care and efficiency in management of pensioners details. In some cases, the pensioners spend up to weeks waiting for simple information such as knowing whether the pension has been paid or not and/or whether the claim has been received in the department or not.

Updating pensioners' details take a long time or are not done at all due to difficulty in retrieving pensioners' files from the Registry. In most cases, a simple task like changing pensioners' personal details such as change of address, paypoint (Bank account) or next of kin details takes a long time or sometimes end up not being effected and consequently leading to misdirection of communication to the pensioners and/or pension payments.

Issues of inconsistency in retirement benefits determination is also very common since the calculations are done manually or through the use of calculators and this leads to errors of omission or commission resulting to underpayment or overpayment to the pensioners.

Currently, the department has many disintegrated legacy information systems that do not share data amongst themselves without human intervention and also operating on diverse platforms. There exists a legacy system used for pensions processing developed in Oracle and running on UNIX operating system while the pensioners' payroll is processed by another system developed in COBOL and runs on a Mainframe environment. These systems have therefore failed to effectively and

efficiently manage the information requirements in the department. These systems also lack features that offer effective customer relationship, secure disbursement of pensions, retirement benefits determination and interfaces with other relevant information systems. In addition to that, the legacy systems that exist in the department are based on old technology platforms that are no longer supported by new developments in the ICT Industry. The existing systems therefore did not cover the entire functions of the enterprise. This challenge must be addressed if progress is to be made.

1.3 Aim and Objectives of the Research

The purpose of this study was to analyze the use of ICTs for efficient management of Civil Service Staff Pension Scheme in Kenya (CSSPS) with a view to develop an Enterprise Resource Planning (ERP) model. This study was based on the following specific objectives:

1. To determine the extent of integration of ICT in the management of CSSPS in Kenya.

2. To establish the usage of ICTs on enhancement of service delivery in Pensions Department and disbursement of pensions.

3. To establish the challenges of managing pensions schemes in Kenya and provide solutions to them.

4. To establish the role of ICTs in enhancing the security and management of Pensions.

5. To develop an Enterprise Resource Planning (ERP) model for the management of CSSPS.

1.4 Research Questions

In order to address the research objectives, the study is guided by the following research questions:

1. To what extent is ICT integrated in the management of CSSPS in Kenya?

2. How are ICTs used to enhance service delivery in the management of CSSPS?

3. What are the challenges facing management of CSSPS and what are possible solutions?

4. How are ICTs used to enhance security of Pensions systems?

5. What model of ICT solution would align ICT Strategy to Pensions Department business Strategy?

1.5 Significance and Justification of Study

The role of ICTs in the world cannot be ignored. The purpose and essence of efficient management of Civil Service Staff Pension Scheme in Kenya is to provide the right to information in the right place, in the right order, at the right time for the right person at the lowest cost. For this fact to be achieved, it is hoped that the ICT solution will assist towards integrating ICTs in Pensions management functions and hence lead to efficient and effective administration of CSSPS. Further, it will demonstrate the value of utilizing ICTs in resolving pension management challenges.

1.6 Scope of the Study

Although Pensions Schemes have many aspects such as the social welfare, economic, actuarial and administrative; the scope of this study focuses on use of ICTs in management of Civil Service Staff Pensions Scheme in Kenya. The study mainly focused on the analysis of processes, data inputs and outputs with a view to develop an ICT solution model. The study therefore did not focus on the social and actuarial

aspects of the Pensions scheme. In addition, this study was limited to the activities within Pensions Department and so its interactions with the other institutions which either provide inputs or use the out puts were not considered.

1.7 Limitations and Delimitations

In carrying out this study the researcher faced the following limitations:

The staffs in Pensions Department were not free to offer information on how pensions processing is done until the researcher assured them that the data being collected is not going to be used adversely. The researcher also had to get clearance from the Director of the Department who therefore notified the staff on the main purpose of data collection. Another limitation was on the confidentiality of Pensioners personal information. During data collection the researcher had to assure the respondents that the data being collected is not about individual pensioners but the focus was on the processes and systems involved. This fear was due to the confidentiality of personal information involving payments.

1.8 Chapter Summary

This chapter introduced the research area by discussing pension's management in Kenya and in particular Government pensions among other pensions managed under Retirement Benefits Authority. It also discusses problems faced in the delivery of pension's services and the purpose of the study.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter on literature review aims at highlighting the works and authorities on the use of ICTs for efficient management of organizations, and also issues of Pensions management in Kenya; and in particular Government Pensions. The chapter reviews selected theoretical and empirical literature on key study variables with the aim of highlighting the existing research gaps. The review examined various sources including books, journals, articles, seminar papers, and government policy papers, conference proceedings, training manuals, legislative documents, research reports, newspapers and thesis.

2.1 Theoretical Framework

This research is based on the concept of Enterprise Architecture (EA) which was initiated to address two problems: 1) System complexity - Organizations were spending more and more money building IT systems; and 2)Poor business alignment - Organizations were finding it more and more difficult to keep those increasingly expensive IT systems aligned with business need (Addison-Wesley, 2003). Studies in this area originated from the Zachman (1987) Framework for Enterprise Architecture and have evolved over the years. Addison-Wesley, (2003) posits that during this period many frameworks have come and gone and currently there are four main frameworks that are widely used namely: Zachman Framework for Enterprise Architecture; The Open Group Architectural Framework (TOGAF); Federal Framework Architecture; and Gartner Methodology.

In this study the researcher adopted the use of Zachman's Enterprise Architecture since its use extends to more than IT and therefore it is cross-disciplinary and enterprise-wide. O'Rourke, et. al, (2003) states that when you thoroughly understand the Framework, you can become more effective in everything you do. This means everything. The other related frameworks such as the Open Group Architectural Framework (TOGAF), Federal Enterprise Architecture (FEA) and Gartner Process were reviewed but were not used since TOGAF also referred to Architecture Development Method (ADM) although referred as a framework can be categorized as a process (TOGAF Version 8.1.1); FEA is viewed as proscriptive Methodology Seifert (2006). and Gartner is best described as enterprise architectural practice and not framework Greta, et. al (2005).

This research was therefore based on the concept of Enterprise Architecture (EA) which originated from the Zachman (1987) Framework for Enterprise Architecture in conjunction with the concept of e-Government. The study also reviewed other technological theories from areas such as Relational Database Management System (RDBMS), Data Warehousing, Data Mining, Business Process Re-engineering (BPR), ICT Security and Structured Systems Analysis and Design Methodology in order to develop an ICT solution which is part of the objectives of the study. Besides, the researcher reviewed the Capacity Maturity Modeling framework but which ultimately was not used in the study given that the model is used to evaluate the maturity of software stage while the study required a model that assists in ERP system development.

2.1.1 Enterprise Architecture (EA)

The motivation to use EA framework was due to the complexity of operations in Pensions Department and the need to develop an enterprise-wide ICT solutions to manage CSSPS. The researcher therefore decided on a model that would set out a holistic approach to the study and also integrate the study of ICT and business which EA provides for (Sowa and Zachman, 1992).

In the modern business world studies have shown that the biggest challenge facing enterprises is change. It was therefore imperative that the researcher uses a model that would enable better planning, design and specification of an ICT Solution so as to have descriptive representations of the things that need to be changed.   Such issues together with the concern about quality, timeliness and change are the conditions that motivated the researcher to use (Sowa and Zachman1992).

EA was developed as a framework by John Zachman in 1987. It has strong ties in the world of business and addresses the strategic and architectural aspects of ICT in business. It is also described as the practice of applying a comprehensive and rigorous method for describing current and/or future structure and behaviour for an organization's processes, information systems, personnel and organizations sub-units, so that they align with the organizations core goals and strategic direction. The model relates more broadly to the practice of business optimization in that it addresses business architecture, performance management, organizational structure and process architecture and is associated with Information Technology (US, Department of Health and Human Services, 2008).

Guney et al. (2006) describe Enterprise Architecture as a concept from the business world which involves identifying the main components of an organization or project

and clearly articulating how these components function together to achieve defined objectives. To achieve that, EA requires a framework for focused business-IT alignment, change management, technology selection and excellence in execution.

The architecture process addresses documenting and understanding the discrete enterprise structural components, typically within the following categories:-business that include strategy, goals, corporate policies, operating model and business processes; applications which include software inventory and diagrams; information that includes data models, that is conceptual, logical and physical; and technical components which consist of hardware, platforms, networking and hosting.

Molina et al. (1998) states that EA process is closely related to the other processes such as enterprise engineering and program management life cycle, more commonly known as the systems development life cycle (SDLC). However, the systems development life cycle concentrates on the process steps rather than looking at the enterprise in its entirety.

EA provides a mechanism for understanding and managing complexity and change as it pertains to key business processes and their related ICT support. It has three parts that is:-baseline architecture which documents the existing systems; target architecture which documents the desired future vision or requirements; and the transition plan that documents how to change from the baseline to the target architecture.

The matrix below depicts a generic framework as described by Sowa and Zachman (1992). It uses a two dimensional classification model, and identifies six levels of abstraction in relation to different interest or stakeholders perspective of the architecture in the first dimension followed by six columns describing the focus of

each of the five identified interests and thereby different ways to describe the real world in the second dimension Sowa and Zachman (1992). The framework is illustrated in the Table 1 below

Table 1.2: Zackman Enterprise Architecture Framework.

	Data (What)	Function (How)	Network (Where)	People (Who)	Time (When)	Motivation (Why)
Objectives / Scope	List of things important to the enterprise	List of processes the enterprise performs	List of locations where the enterprise operates	List of organizational units	List of business events / cycles	List of business goals / strategies
Model of the Business	Entity relationship diagram (including m:m, n-ary, attributed relationships)	Business process model (physical data flow diagram)	Logistics network (nodes and links)	Organization chart, with roles; skill sets; secure issues.	Business master schedule	Business plan
Model of the Information System	Data model (converged entities, fully normalized)	Essential Data flow diagram; application architecture	Distributed system architecture	Human interface architecture (roles, data, access)	Dependency diagram, entity life history (process structure)	Business rule model
Technology Model	Data architecture (tables and columns); map to legacy data	System design: structure chart, pseudo-code	System architecture (hardware, software types)	User interface (how the system will behave); security design	"Control flow" diagram (control structure)	Business rule design
Detailed Representation	Data design (denormalized), physical storage design	Detailed Program Design	Network architecture	Screens, security architecture (who can see what?)	Timing definitions	Rule specification in program logic
Function System	Converted data	Executable programs	Communications facilities	Trained people	Business events	Enforced rules

Source: Zackman, 1987

The researcher used this matrix in the analysis stage to depict the operations of the Pensions Department. The resultant matrix forms the basis of this study since it is easy to understand, addresses the enterprise in its entirety, helps the researcher to solve complex concepts and communicate, and helps the researcher in planning and isolating components without losing the sense of the enterprise as whole.

Zachman's motivation for developing the framework was to improve the management of the ever increasingly complex information systems. The reason for the increased complexity was not only the increasing size of the systems, but also the systems started to get distributed across the enterprise. This original motivation was founded as a result of the technical evolution of IT. However this motivation has evolved in parallel with the concept of EA (Zackman, 1992). This same motivation has encouraged the researcher to use the model as Pensions Department is growing in size, complexity of Pensions Systems and the need for distribution of the citizen.

2.1.2 E-Government

Chissick et al. (2004) defines electronic government as the provision of public access to information about all the services offered by the central government departments and their agencies; and enabling the public to conduct and complete transactions for all those services. It can also be referred to as the ability of government to harness new technology to transform the internal efficiency of government departments and to reinvent government's relationship with citizens, business and other government branches. The idea is to take the business principles and information technologies and apply them to the public sector and deliver services that are similarly client centered, responsive and as efficient as their private sector counterparts.

Walczuch, Braven, et al. (2000) further define E-Government as the integration of ICT in the management of government services in order to enhance delivery of services and decision making.

Most governments in a bid to enhance their efficiency and delivery of services have hence integrated the use of ICT in their operations. ICT is perceived as an enabler for more efficient operations, better quality of service provision and easy public access to government information and services. Provision of accurate and timely information about the external environment and stakeholder requirements are at the heart of effective decision making, policy development and administration (Grant and Chau, 2005) cited by (Kirkgaard, 2008).

The primary delivery models are Government-to-Citizen or Government-to-Customer (G2C), Government-to-Business (G2B), Government-to-Government (G2G) and Government-to-Employees (G2E). E-Government makes the use by the Government agencies of information technologies such as Local Area Network (LAN), Wide Area Network (WAN), the Internet, and mobile computing that have ability to transform relations with citizens, business, and other arms of government. These technologies facilitate a variety of services: - better delivery of government services to citizens, improved interactions with business and industry, citizens' empowerment through access to information, or more efficient government management. Chissick et al., (2004) state that the resulting benefits of using e-Government are therefore less corruption, increased transparency, greater convenience, revenue growth and/or cost reductions.

In today's economy, Government information is not only crucial in the development of a nation but it is a basic right for each citizen. It is therefore the duty of

governments to avail relevant and timely information to their citizens for timely decision making. This is achievable through the use of ICTs so as to have a balanced knowledgeable citizenship as well as an efficient and effective system of governance. With e-government, information about the services offered by the government through different ministries can be disseminated faster up to the grass root levels. This improves the delivery of government services to all citizens wherever they are and whenever they need it.

The adoption of e-government improves governance through the use of ICTs in public administration which impacts on public service delivery, democratic processes, transparency and accountability. Using this framework in this study enables the researcher to find out how e-Government can be used in the Pensions Department in sharing information with other stakeholders such as the pensioners, ministries/departments and banks.

2.1.3 Systems Development Life Cycle (SDLC)

As part of the literature review the researcher examined issues pertaining to the System Development Life cycle (SDLC) which breaks down a software development project into phases. Van Vliet , Hans (1993) states that SDLC is a conceptual model used in project management that describes the stages involved in an information system development project, from an initial feasibility study through maintenance of the completed application. The figure below shows the stages in SDLC:-
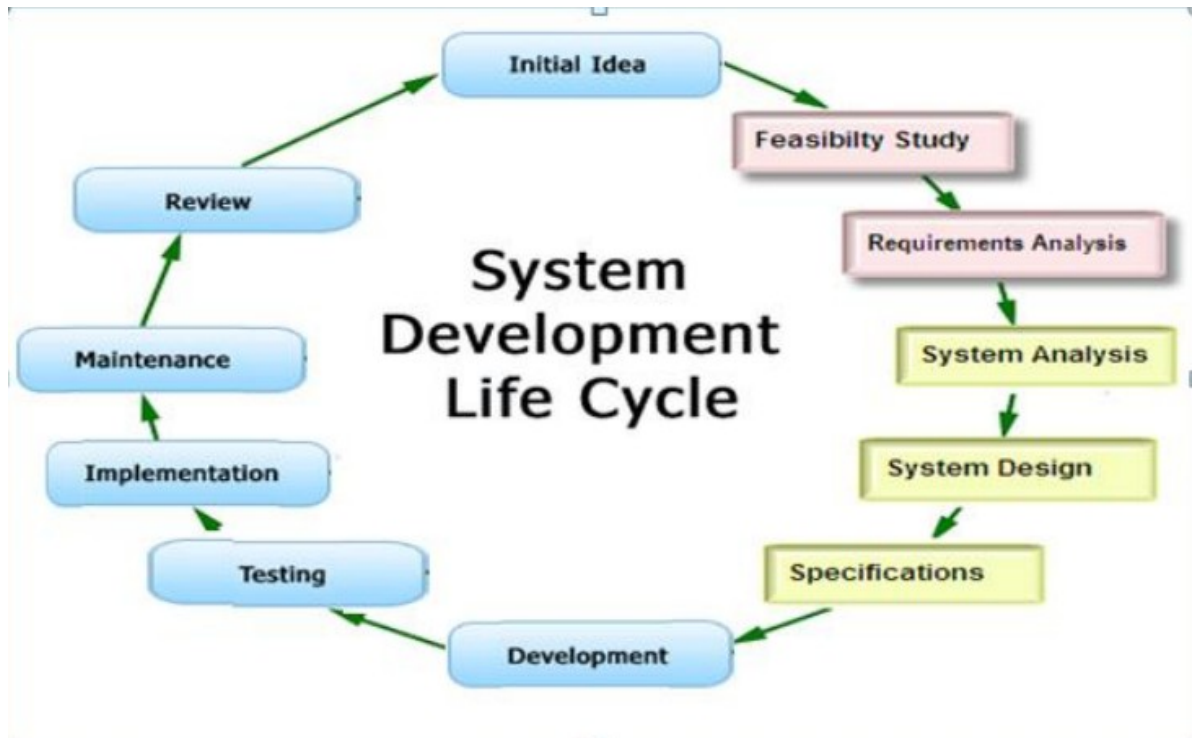
Source: Sommerville**, (2007)**

Figure 1: Systems Development Life Cycle.

In this study the researcher used Structured Systems Analysis and Design Method (SSADM) because the main purpose of the study was to develop an ERP for CSSPS system which is a software development project. Ashworth, C. and Goodland, M. (1998) describe SSADM as a set of standards developed in the early 80s for the stages of system analysis and application design of system development and uses a combination of text and diagrams throughout the whole life cycle of system design, from the initial design idea to the actual physical design of the application. SSADM builds on the traditional Systems Development Life Cycle (SDLC) and has clearly defined stages; it thus lends itself to project management techniques as a standard methodology on Information Systems Projects

2.1.4 Relational Database Management System (RDBMS)

The term relational database was originally defined and coined by Edgar Codd at IBM Almaden Research Center in 1970. The theory of Relational database uses a different set of mathematical-based terms, which are equivalent, or roughly equivalent, to Structured Query Language (SQL) database terminology. The term consists of a relation or table tuple or row attribute or column (Codd, 1970). An ICT solution consists of database which is used to store data, application which automates the business rules, hardware and network infrastructure. In this study the database will play a major role since the department handles a lot of data. It is therefore imperative to understand the technology behind databases and in particular RDBMS.

Codd, (1970) defines RDBMS as a collection of data items organized as a set of formally-described tables from which data can be accessed or resembled in many different ways without having to reorganize the database tables. Reviewing this technology is very critical in this study since it forms the core of the prototype ICT solution which is an objective in this research. The researcher reviewed some of the RDBMS products such as Oracle, MySQL and SQL Server with an intention of using the same in the development of the CSSPS prototype.

2.1.5 Data Warehousing

According to Cleary (1998), data warehouses are primarily designed to retrieve data from a series of diverse sources which is then isolated and stored in a data warehouse. Hwang, et al. (2004) cited by Majewski gives a classic definition that a data warehouse is a repository of an organization's electronically stored data which are designed to facilitate reporting and analysis. This classic definition of the data warehouse focuses more on data storage. Cleary (1998) further states that the broader

definition of a Data Warehouse includes these components: - means to retrieve and analyze data, transform and load data, and manage the dictionary data which are also considered essential components of a data warehousing system. Many references to data warehousing use this broader context. In other words, Cleary, (1998) adds that the broader definition for data warehousing therefore includes business intelligence tools, tools to extract, transform, and load data into the repository, and tools to manage and retrieve metadata.

Dates et al. (2001) states that data from disparate operational systems from both within the organization and outside can be collected together into separate data store called ware house that can eventually be used for Decision Support system. This data store provides a single source of data for all decision support activities. In this definition, a data warehouse is considered to be a central store of data from different environments. Review of this technology will equip the researcher with a better understanding how data from various locations for instance government ministries can be consolidated for better use in the delivery of pensions services

2.1.6 Data Mining

Thearling (2004) defines data mining as the process of sorting through large amounts of data and picking out relevant information. It is usually used by business intelligence organizations, and financial analysts, but is increasingly being used in the sciences to extract information from the enormous data sets generated by modern experimental and observational methods. It has been described as "the nontrivial extraction of implicit, previously unknown and potentially useful information from data and the science of extracting useful information from large data sets or databases.

It can also be referred to as the statistical and logical analysis of large sets of transaction data, looking for patterns.

Since the operations of the department are getting more complex due to the emerging technologies and the volumes of data in the department increases faster and putting a bigger burden on the Exchequer in meeting the expenditure required for pensions payment, it is imperative that the concepts of data mining be considered in this study since data mining is used in determining data patterns that assist in forecasting and planning business organization. Dates et al. (2008) describes data mining as "exploratory data analysis".

This theory is closely related to the data warehouse theory; however, this theory is more concerned with the retrieval of specific information from the data that has been consolidated from various sources. It is therefore important that both the theories be reviewed in this study due to their interrelationships and applications to ERP design.

2.1.7 Business Process Re-Engineering (BPR)

According to Cleary (1998), modern technology has resulted in a total change within the global business culture. This implies that the integration of ICT in any organization will require the organization to re-engineer its structures and processes. Besides, the organization has to re-educate and re-skill the human resources to adopt the modern technology and also change their mindset.

This study involved a research on how the integration of ICT in the management of CSSPS affects the Business processes, Organization structure and the staff change management. Cleary (1998) states that change is a constant force and the fact is that relatively recent computing and technological advances have been so dramatic that

user and developers of every type have had to constantly re-engineer their structures and processes to stay within mainstream commercial practice. Theories on change management and Business process re-engineering were hence reviewed in this study for the researcher to get a better understanding how BPR can be managed as major change in the organization

2.1.8 Other Models and Theories

The other model looked at was Capability Maturity Model (CMM) which according to Gartner (2001), CMM for software is a widely accepted set of guidelines for developing high-performance software organizations. It states further that the model was first developed by Watts Humphrey and his colleagues in 1980s and the motivation was that the quality of an application was related to the quality of processes used to develop it. The model has six maturity levels namely: - initial, repeatable, defined, quantitatively managed and optimizing.

However, this was not used in this study because it was not considered appropriate as the researcher adopted a model that would lead to development of a system since the study required a model that would allow for the analysis of the business processes and technology and the design of an information system which CMM could not provide for. In the final analysis, CMM was not used in the analysis since it only assessed the level of maturity of software development organization and does not address system requirements, specification, design and implementation of an IS.

2.2 Extent of integration of ICT in management of CSSPS in Kenya

Iversen et. al, (1998) posits that today, innovations in information technology are having wide-ranging effects across numerous domains of business, and policy makers

are acting on issues involving economic productivity, intellectual property rights, privacy protection, and affordability of and access to information Choices made now will have long-lasting consequences, and attention must be paid to their social and economic impacts. One of the most significant outcomes of the progress of information technology is probably electronic government over the Internet, a new way of conducting government business. Therefore, this study highlights how ICT can be integrated in the management of CSSPS in Kenya.

The rapid and continuing spread of E-Government is undisputed. The prevailing applications of E-commerce are Government to business, Government to consumer (Citizen), Government to Government and Government to Employees. E-Government today remains mostly a US and Western based activity. Although connectivity has significantly improved in many parts of the developing world there are still significant disparities in the level of Internet penetration across world regions (UNCTAD 2002).Therefore the current research will investigate the use of ICTs for efficient management of Civil Service Staff Pension Scheme in Kenya (CSSPS). This can lead to the development of e-Pension.

Whilst acknowledging the likely benefits that can accrue from E-Government, namely, cost reductions and business efficiencies, these are perhaps more used in private sector organizations. However, the view exists that, potentially, E-Government can benefit local socio-economic community development (UNCTAD 2003). In Kenya, the government is already exploring the use of E-Government services through the E-Government Strategy and as envisioned in Kenya Vision 2030. So far all the ministries in Kenya have websites and Kenya has a government portal which is used to provide information on the services available and how to access such

services in addition to having Ministries based email accounts (www.Kenya.go.ke). Besides, many government organizations have embarked on implementation of web based applications such as Tax Registration by Kenya Revenue Authority (www.kra.go.ke), examinations results by the Ministry of Education (www.education.go.ke), Status of Pension Claims amongst others. These services are offered through a product e-Huduma services (www.hudumakenya.go.ke). The integration of ICT in Pensions management will boost the e-Huduma services by enhancing the information available to serve the pensioners.

One innovation that has been gaining ground in Kenya for money related transactions is the mobile money. Mobile phone technology has reduced communication costs in many parts of the developing world from prohibitive levels to amounts that are, in comparison, virtually trivial. Nowhere has this transformation been as acute as in sub-Saharan Africa, where networks of both fixed line communication and physical transportation infrastructure are often inadequate, unreliable, and dilapidated (Suri et al, 2009).

Although mobile phones were initially introduced to ease communication, they have gained prominence as a means for mobile money transfer or e-money. E-money can be transferred from one customer's Mobile account to another using SMS technology. Originally, transfers of e-money sent from one user to another were used primarily for remittances, but nowadays, while remittances are still an important use of Mobile money (e-money), they are often used to pay directly for goods and services, from school fees to the wages/salaries and dividends to beneficiaries. This has influenced the financial sector and most institutions are adopting the use of mobile technology in their transactions.

2.3 Usage of ICTs to enhance service delivery in Pensions Department

Kenya, through Vision 2030 recognizes ICT as a foundation for a knowledge economy. Developing affordable information and communication network infrastructure and applications is central to building the information economy. Accordingly, the Government's objective is to ensure that the country has a competitive telecommunications industry that delivers reliable and affordable services and products for the economic and social benefit of citizens (ist-africa.org). This has been developed further by the Kenya ICT Master Plan 2017 which states that ICT is focused on driving real economic growth. The master was developed based on the four key pillars:- foundational pillar which forms the platform and consists of integrated ICT infrastructure and info-structure, country positioning, enhanced citizen capacity; Enhanced Public Value which focuses on enhancement of the quality of life for all Kenyans; Development of ICT Businesses such as Konza City and Digital Villages; Strengthen ICT as a driver of industry by enhancing significantly their productivity, global competitiveness and growth (www.ict.go.ke).

The use of ICT in Pensions is therefore important in ensuring that service delivery is enhanced as outlined in the Kenya ICT Master Plan 2017 hence development of an ERP for management of CSSPS would therefore complement the efforts stated in the Master plan and Vision 2030.

2.4 Role of ICTs in enhancing security of an organization's data/information

The integration of ICT in the business management of an organization can result into having a negative impact on the security of an organizations data/information. ICT security in an organization cuts across several resources in the organization such as hardware, software, personnel, data, communication and network /Internet. Any

threat on any of these resources can cause a big loss to the organization. Investment on the security in most organizations that have implemented ICT is normally high and yet there is no direct benefit. Clearly (1998) observed that users have discovered that failure to invest in appropriate security procedures can be catastrophic and is an issue which can no longer be ignored or skimped.

According to Trappe and Washington (2006), Encryption is the process of transforming plaintext data into cipher text in order to conceal its meaning and so preventing any unauthorized recipient from retrieving the original data. Hence, the main task of encryption is to ensure secrecy. Organizations usually encrypt their data before transmission to ensure that the data is secure during transit. The encrypted data is sent over the public network and is decrypted by the intended recipient. There are many encryption algorithms developed and widely used for information security. Encryption uses two keys that are private and public keys. Public key is used for encryption and private key is used for decryption. Public key is known to the public while private key is known only to the user who is receiving or opening data. In this study, the researcher is going to look at how to implement appropriate data encryption algorithms in order to secure data stored in the database and data exchange between the department and other government organizations.

The researcher also reviewed the use of biometric authentication in the Information Systems with a view to apply the same in the management of Pensions ICT solution. Jain et al., 2004, states that biometric is used to establish an identity based on who you are rather than by what you possess (e.g. identification cards) or what you re-member(e.g. passwords). Biometric authentication is therefore referred to as auto-matic identification, or identity verification, of individuals using behavioral and/or

physiological characteristics such fingerprints, hand geometry, retina, iris, face or voice recognition. Jain et al., (2004) further concludes that Biometric is the most secure and convenient authentication tool. It cannot be borrowed, stolen, or forgotten and forging one is practically impossible since it uses individual's unique physical or behavioral characteristics to recognize or authenticate their identity.

2.5 Challenges Hindering Effective use of ICTs in CSSPS

Many governments in the African continent including the East African region have realized the benefits of using ICTs in civil service reforms. The Ministers for Education, Science and Technology have stressed their governments' commitment in promoting the usage of ICTs Omwenga et.al, (2004). Besides, the Government of Kenya has recognized that use of ICTs is important in driving the Social, Economic and Political growth of the country and hence included ICTs as a cross-cutting factor in all the three pillars of Kenya Vision 2030 (GOK Vision 2030, 2013).

According to the UNDP (2001), the challenges that have affected the use of ICT globally include: awareness which creates attitude towards technology; existing regulations/laws which do not encourage the use of ICT; access which is due to ICT infrastructure, educational and/or socio-cultural differences; relevance and adequacy of information provided; fast change in technology leading to insufficient training and inappropriate technology; and lack of coordination which leads to very little support in automation.

Review of pensions act, pension's operations manual, brochures and information in the website (www.treasury.go.ke) points out to lack of programs that can be used to train pensioners in their awareness on the pension's services offered online; and inadequacy of information offered online or in brochures.

The challenge of infrastructure affects many developing countries since for access of ICT services one needs to have infrastructure (electricity, telecommunication and computers) which is a challenge to most pensioners. The World Bank (2002) cites the challenge of expanding telecommunication networks in developing countries as a primary concern.

Titah and Barki (2006) suggested that the challenges affecting use of ICT can be divided into individual and organizational. The adoption of the Government-to-consumer model in e-government is so much dependent on the empowerment of the customers through training and access to ICT recourses.

2.6 Research Gaps

This chapter reviewed the theoretical areas that relate to the research study undertaken. Examination of the technological literature strongly suggests that potential benefits can accrue from the use of ICTs in Pensions Management. Concurrently the literature reviewed pointed to inadequate application of ICT in Pensions Department. The use mobile money, e-huduma services, web access and many other existing ICTs have a great potential of increasing service delivery in pensions and thus leading to e-pension which is an effective use of ICTs in the management of CSSSPS in Kenya.

2.7 Chapter Summary

Although the study reviewed many models, however the models used in this study were EA in conjunction with the e-Government framework to find out the shortcomings within the pensions Department based on the data(what), Function(how), Network(where), People(who), time(when) and motivation(why) as defined in EA and also the e-Government whose primary delivery models are

Government-to-Citizen or Government-to-Customer (G2C), Government-to-Business (G2B), Government-to-Government (G2G) and Government-to-Employees (G2E). Besides, technological theories that are required in this study for the development of an Enterprise-wide ICT solution were considered.

From the preceding discussions, and review of literature, it is clear that several factors may help to explain the pattern of ICT adoption in Civil Service Staff Pension Scheme in Kenya. However, to attempt to include all these in a model is generally not a viable option. Limited research funds may limit the amount of data that can be collected. In addition, linearity generally exists among a number of these factors, precluding their inclusion in modeling efforts. Considering this limitation, therefore, those factors hypothesized to exert the largest influence on ICT adoption, given the circumstances in the study area, are investigated in the analyses. As discussed above, they include management characteristics, institutional factors and information delivery mechanisms, ICT infrastructure, high levels of illiteracy in ICT. Other notable challenges encountered include: Financial constraints, frequent vandalism, frequent power disruptions, poor networking and limited to urban centers. These factors may act as either incentives or barriers to effective use of ICTs for efficient.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter contains a description of: the study area, the methods used in the collection of data, and the sampling frame. A review of techniques used to analyze this kind of data, including their limitations is presented, and the conceptual models used for data analysis are developed.

3.1 Research Design

The researcher used a mixed research approach that combined both qualitative and quantitative data collection and analysis. Quantitative data was collected by use of questionnaires and was used to determine the extent to which the use of ICTs in pension's management enhances service delivery and security of data/information while the qualitative data collected through interviews was used in systems analysis and development. The system analyses lead to system design and development.

3.2 Study Population

The target population of this study comprised of staff members of Pensions Department, Ministry of Finance - Kenya who are involved in pensions processing and disbursement. The staff members of Pensions Department provided subject matter expertise during the systems analysis, specification, design and development of the ICT solution while a large number of the staff was provided with questionnaires. The complement control (2012) shows that the staff population were two hundred and twenty (220) members who perform various functions in the department and serve 710,000 pensioners (Pensions Department's Pensioners Register, 2013). Forty (40) out the total staff membership are in the management and are involved in the general

management of pensions and policy formulation while the rest belong to the operational level and are involved in day to day operations of the department. This study targeted the management level which consists of the Administrators and Subject Matter Experts (SMEs) and the Operational level that support the functional areas in the department and also provided services to the pensioners. This is illustrated in the table 1 below.

Table 3.4: Target Population

Description	Population
Administrators	10
Subject Matter Experts (SMEs)	30
Operational level	180
Total	**220**

Source: Pensions Department's Pensioners Register, 2013.

3.3 Sampling Techniques and Sample size

Sampling is the selection of some part of an aggregate or totality on the basis of which a judgment or inference about the aggregate or totality is made (Kothari, 2009). According to Kerlinger (2000), sampling is a process of selecting a portion or sub-set of population on which research will be conducted, in order to ensure that conclusions from the study may be generalized to the entire population. In seeking information towards the context of this study, the researcher decided to use purposive sampling. The purposive sampling was applied to all staff. According to Frankel and Wallen, (2000) purposive sampling is appropriate when a researcher deliberately and subjectively selects certain individuals from a population. It is based on one's knowledge of the population and the objective of the research. The choice was based on the fact that the researcher has knowledge of the population so that their expertise could be captured in the study since the study was largely qualitative. Purposive sampling is appropriate in three situations: first, a researcher can use it to select unique cases that are informative; secondly may use in difficult-to-reach specialized

population; and thirdly can be used when wants to identify particular types of cases for in-depth investigation (Kothari, 2009).The researcher first undertook a task of knowing background information about the users and stakeholders and later on selected a sample of ten (10)members of staff with knowledge in various functional areas to be interviewed in order to gather systems requirement and also to participate in the system development life cycle This helps ensure that the needs of all those involved are taken into account. If required, the system is tested by them. User groups may include end users, supervisors, installers, and maintainers. Other stakeholders include recipients of output from the system, marketing staff, purchasers and support staff (Cochran, 1997). Although only five people were selected for interviews, the user requested for the assistance of the other members of staff through the ten(10) key users to assist in various tasks such as reviewing analysis and design and also testing the end product during system development. The sample of 58 respondents was randomly selected across the department, that is, from operations to the management level. This approach is considered suitable for the study. In this regard, the study population of 63 respondents was drawn from Management Staff, Retirement Benefits Determination Staff, Pensions Accounting and Payroll Staff, ICT Staff, Records Management Staff, Customer Care Staff and Claims staff as illustrated in the table 2 below.

Table 3.5: Sample size

No.	Staff	Sampling Method	Population Distribution	Sample
	Questionnaires			
1	Management Staff	Random Sampling	20	10
2	Retirement Benefits Determination Staff	Random Sampling	20	12
3	Pensions Accounting and Payroll Staff	Random Sampling	20	12
4	ICT Staff	Convenience	10	8
5	Records Management Staff	Census	8	8
6	Customer Care Staff	Convenience	11	8
		Sub Total	**84**	**58**
	Interviews			
7	Claim, Retirement Benefits Determination, Customer Care, Records Management, Accounts and Payroll	Purposive Sampling		**10**
		TOTAL		**68**

Source: Survey Data (2012)

The researcher did not consider the clerical officers, drivers and support staff in the study since they work under the instructions of designated officers.

3.4 Data collection instruments

The study collected data from both primary and secondary sources. Primary data was obtained using questionnaires and personal interviews. Secondary sources included:- textbooks, government publications, journals, libraries, archives and government offices among others.   In order to meet the objective of the study, the following instruments namely; questionnaires and interview schedules were used to collect data.

3.4.1 Questionnaires

Questionnaires were used to gain a general picture of the effective use of ICTs for efficient management of Civil Service Staff Pension Scheme in Kenya and the role of ICTs in enhancing security of data/information in Pensions Department.

The questionnaires contained a number of items which were used primarily to solicit for responses pertaining to the research objectives, such as: management of Civil Service Staff Pension Scheme in Kenya, the extent of integration of ICT in the management of CSSPS in Kenya, the usage of ICTs on enhancement of service delivery in Pensions Department and disbursement of pensions, role of ICTs in enhancing the security of Pensions Systems and the challenges of managing pensions schemes in Kenya. Questionnaires comprising both open and closed-ended questions were used in the study. The questionnaire schedule comprised of questions on personal data (age, gender, level of education, and their occupations). Some structured questions had either Yes or No or True or False alternatives. The above opinions were measured by requesting the respondents to indicate Yes or No based on a five-point Likert-type scale, anchored on "1= strongly disagree, 2= disagree, 3=undecided, 4=agree, and 5= strongly agree." Their agreements or disagreements with a series of statements characterized the effective use of ICTs for efficient civil service pension's

management in Kenya. The questionnaires contained questions about their perspectives and some personal questions to reach to some contextual sense of the answers to research questions such as name, age, position etc.

The questionnaires consisted of two parts. The first part covered certain demographic data about the respondents. The second part included items sought to answer research questions. The advantages of the questionnaires were that they generated a considerable amount of information that enabled the researcher to obtain a wider coverage of description data at a comparatively low cost in terms of time, money and effort (Cohen and Marion, 2003). The questionnaires were administered to all the sample size, that is, Management Staff, Retirement Benefits Determination Staff, Accounting Staff, Payroll Staff, Records Management Staff, Customer Care Staff and ICT Staff.   Pre-testing of questionnaires in the field was used as a means of improving the quality of questions before the main study. Test results were evaluated and changes to the questionnaire were made.

A sample of the questionnaire is provided as in appendix B.

3.4.2 Interviews

The study employed the use of interviews as a method of collecting data. This method was used for collecting information from the respondents. This involved collecting information necessary for system requirements analysis and design. The researcher conducted face to face interviews with the subject matter experts who included Management Staff, Retirement Benefits Determination Staff, Accounting Staff, Payroll Staff, Records Management Staff, Customer Care Staff and ICT Staff on their areas of expertise. The interviews included issues to do with general management, policy formulation issues, operational level issues such as the workflow, data

requirements, business processes and the challenges faced in the provision of services. This method enabled the researcher to clarify some of the questions when/if deemed necessary. Interview method provided for qualitative and in-depth data collection as it presented an opportunity to explain the purpose of the study. It ensured that there was clarification of views and opinions which would not be clearly tackled by the questionnaire. In interviewing the respondents, the Researcher acted as a guide only, and this made the interview non-directional (non-subjective).

According to Yin (2003) the strengths of interviews include being targeted and insightful: focusing directly on the case study topic and provision of perceived casual inferences respectively. However, in this context the interviews exhibited some weaknesses namely: - response bias, inaccuracies due to poor recall and reflexivity: as a result of poorly constructed questions and interviewees giving interviewers what they want to hear. The interview lasted between 15 to 30 minutes and the respondents were asked to comment on the usage of ICTS in relation to civil service pension's management in Kenya, Pensions business processes and the general management and operations of pensions.

A sample of the interview questions will be provided as an appendix C.

3.5 Data Collection Procedures

The researcher proceeded to collect data from the selected respondents after receiving permission from the School of Information Sciences; Moi University to enable him to get the research permit from Ministry of higher Education. The researcher visited the study area before hand for familiarization and acquaintance with targeted respondents, especially thePensions Department Office.During this visit, the nature and the purpose of the research was explained to the respondents by the researcher. The researcher

assured the respondents that he respects the individuals' rights to safeguard their personal integrity. The respondents were further assured of anonymity and confidentiality. No identification numbers or names were reflected on the questionnaires. After familiarization, data was collected from the respondents using the three mentioned instruments. The completed instruments were verified and collected by the researcher within a period of two weeks from the day of distribution.

3.6 Data Analysis

Data was collected by means of questionnaires and interviews schedules. This approach was chosen because it offered the use of different research techniques giving many advantages. Kothari, (2004), for example, suggested that the use of mixed approach offers greater validity and reliability than a single methodological approach. Dixon et al. (1988) states that most research objectives can be researched using more than one technique of data collection; providing detailed data about the phenomenon being investigated. The data collected by the use of questionnaires for the purpose of this study was adopted and coded for completeness and accuracy. Microsoft Excel 2007 was used for all the data analysis and interpretation where descriptive statistics was used. This entailed the use of frequencies, percentages, bar graphs and tables to summarize and organize data and also to describe the characteristics of the sample population. While data collected through interviews was structured using the Structured System Analysis and Design Methodology to come up with Data Flow Diagrams, Entity Relationship Diagrams, Tables and Screens which later on was used to develop system.

3.7 System Modeling and Implementation

Since the main purpose of this research was to develop and CSSPS ERP the researcher deployed Systems Development Methodology. Abdou (2011) describes system development methodology as a methodology that provides guidelines to follow for completing every activity in the systems development life cycle. He posits Structured Systems Analysis and Design Methodology (SSADM) and alternative methodologies which included Object Oriented which views an information system as a collection of interacting objects that work together to accomplish tasks.

In this study the researcher used SSADM as a methodology and modeling Data Flow Diagrams (DFD) and Entity Relationship Diagrams (ERD) as modeling tools. The process is described below.

3.7.1 Structured Systems Analysis and Design Methodology (SSADM)

SSADM is the methodology that was used to analyze qualitative data collected through interviews with the subject matter experts that were interviewed for the purpose of systems development which required a deeper understanding of the functions and operations in pensions department. Ashworth, C. and Goodland, M. (1998) states that SSADM application development projects are divided into five modules that are further broken down into a hierarchy of stages, steps and tasks:

1. **Feasibility Study** - the business area is analyzed to determine whether a system can cost effectively support the business requirements. In this stage the researcher carried out a preliminary study to get the understanding of Pensions Department and establish the problem without going into detail how the problem affects the

operations. This was done informally through review of documents, interviews and observation of the works processes.

2. **Requirements Analysis** - the requirements of the system to be developed are identified and the current business environment is modeled in terms of the processes carried out and the data structures involved. This is the stage the researcher did a detailed analysis of the existing systems with a view to model a design of an appropriate system as a solution to the problems identified. The research carried out a detailed organizational and functional analysis. At this stage the researcher carried out in-depth interviews with the subject matter experts on the actual business processes, sources of inputs and outputs and any other activities that are required for pensions processing. During the interviews the researcher was also provided with operations manuals, standard forms used in pensions processing, pensioners files for different categories and Pensions acts. The researcher was also taken through how the retirement benefits are determined and the necessary stages required for approvals. This stage assisted the researcher in developing analysis on the current business processes and the legacy systems currently existing in the department in order to find out weaknesses that existed. Besides, the researcher also collected data on the organization structure and the responsibilities of functional divisions.

3. **Requirements Specification** - detailed functional and non-functional requirements are identified and new techniques are introduced to define the required processing and data structures. Based on the findings in the requirement analysis stage the researcher identified all the functional requirements which included the business processes, data storage facilities, sources of data and reports. The targeted functional divisions which included: Claims, Registry, Accounts, Assess-

ment, Payroll, CRM, Directorate and Audit. The researcher also identified non-functional requirements related to ICTs. Data sources, processes and information requirements were clearly identified and documented. All the identified functional and non-functional requirements were reviewed by the subject matter experts (users) to ascertain if their requirements are captured.

4. **Logical System Specification** - technical systems options are produced and the logical design of update and enquiry processing and system dialogues. At this stage the researcher used the user requirements to develop specifications for the envisaged system. The specifications included processes design, identification of entities and their relationships, input forms design, reports design and design of tables. The researcher conceptualized Pension System as one system consisting of many subsystems for instance claims subsystem, registry subsystem, assessment subsystem, accounts subsystem and payroll subsystem. These subsystems perform different functions but are integrated. In addition sources of input data and output data were also identified. The researcher used data modeling tools in this stage design the CSSPS. Data Flow Diagrams (DFD) were used to design business processes; and Entity Relationship Diagrams (ERD) were used to identify entities and their relationships. Normalization was used in the design of tables and their attributes to ensure that cardinality, uniqueness and referential integrity are considered. The researcher hence designed all the tables that are relevant in CPPS.

5. **Physical Design** - a physical database design and a set of program specifications are created using the logical system specification and technical system specification. This is the stage where the researcher converted the logical design into physical design using software tools to build system components such as menu, data ta-

bles, screens and programming of the procedures. The researcher used MySQL to create the database and tables; and ASP.NET and PHP to build the screens and code (create) the programs. The developed screens, programs, database tables were tested for both functional and syntax errors with assistance of the subject matter experts. After the development the system was implemented in an environment with MS Windows as the operating system and accessed through browsers such as Internet explorer and/or Mozilla Firefox.

These five stages can further be split into two phases namely:- Systems Analysis covering feasibility studies and Requirement Analysis; and System Design covering Requirement specification, Logical System Specification (design) and Physical Design (System construction).

3.8 Ethical Considerations

The Researcher complied with the following principles which aim at protecting the dignity and privacy of every individual who was requested to provide personal or professionally valuable information about him/her or others (hereinafter referred to as a subject of research). The identity of individuals from whom information was obtained in the course of the research was kept strictly confidential. At the conclusion of the study, any information that revealed the identity of individuals who were subjects of research was destroyed. No information revealing the identity of any individual was included in the final report of this study.

No individual became a subject of this research without being given the notice referred to in the preceding paragraph and providing a freely given consent that he/she agrees to participate. No pressure or inducement of any kind was applied to encourage an individual to become a subject of research.

3.9 Chapter Summary

This chapter summarizes data collection instruments engaged in the study. The researcher used instruments that were capable of collecting both qualitative data and quantitative data due to the complexity of the study area.

CHAPTER FOUR

DATAPRESENTATION, ANALYSIS AND INTERPRETATION

4.0 Introduction

This chapter presents analysis of the data gathered using the tools discussed in the previous chapter. The statistical Package for Social Scientists (SPSS) 18 for windows was used to derive the descriptive and inferential statistics relevant to this study. This chapter focuses on the analysis, interpretation and discussion of the study findings. Univariate analysis was conducted to establish the descriptive statistics. Tables, figures, Bar and Pie charts, frequencies, mean and Standard deviation have been used to summarize and illustrate the findings of the study. The data analyzed and presented is based on the responses to the items in the administered through Questionnaires, interview schedule and document analysis. This chapter is sub-divided into main sub-sections. The first sub-section presents and discusses the background information of the respondents including; gender, age and the qualifications of the respondents.The second set was based on specific questions; it investigated the effective use of ICTs for efficient management of Civil Service Staff Pension Scheme in Kenya (CSSPS) with a view to develop an Enterprise Resource Planning (ERP) model (ICT Solution Prototype). Attempts have been made to make reference to other related information in different parts of the thesis.

4.1 Extent of integration of ICT in the management of CSSPS

Items related to extent of integration of ICT in the management of civil service staff pension scheme (CSSPS), in both strongly agree, agree, neutral, disagree and strongly disagree incidents, were eventually arranged into five categories; (1) trained on basic computer skills and can operate a computer. (2) have access to a computer at your

work place and/or at home. (3) Frequency of using computer in office work. (4) Reasons for using computers in the office and (5) offering services to the Pensioners through Internet/Web, SMS or mobile phone. A total of 48 responses were received from 48 respondents. The frequency distribution based on how they responded to the questions in this area is sown in table 1 below:-

Chapter 4: Table 1: Extent of integration of ICT Usage

		Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
		F	%	F	%	F	%	F	%	F	%
Q1	You have been trained on basic computer skills and can operate a computer?	24	50	6	12	9	19	5	10	4	9
Q2	You have access to a computer at your work place and/or at home	27	56	13	27	0	0	0	0	8	17
Q3	How frequently do you use a computer in your office work	11	22	9	19	5	10	13	27	11	22
Q4	What do you use computers for in the office?	11	22	4	9	13	28	16	32	4	9
Q5	You offer services to the Pensioners through Internet/Web, SMS or mobile phone?	5	11	1	3	0	0	0	0	42	86

On whether the respondents have been trained on basic computer skills, 24 (50%) respondents indicated strongly agree (trained); 6 (12%) indicated agreement (trained); while 11 (19%) indicated neutrality that is not sure; 5 (10%) disagreed (no basic training): while 4 (9%) indicated strongly disagreed (no basic training).

On whether the respondent have access to a computer at work place and/or at home, 27 (56%) indicated strongly agree (has access to computer); 13 (27%) indicated agreement (has access to computer); while 8 (17%) indicated strong disagreement (has no access to computer).

Regarding the frequency of usage of computer in office work, 11 (22%) respondents strongly agreed (use computers everyday); 9 (19%) agreed (use computers once a week); 5 (10%) neutral (once a month - not sure); 13 (27%) disagreed (use computers

in more than a month or not at all): while 11 (22%) strongly disagreed (do not use computers).

On the question of what do respondents use computers for in the office, 11 (22%) respondents strongly agreed (MS Office applications and Pensions processing); 4(9%) agreed (Internet and office communications); 14 (28%) neutral (pensions processing alone); 16(32%) disagreed (do not use computers); while 4 (9%) strongly disagreed (do not use computers).

On the question of whether the respondents offer services to the Pensioners through Internet/Web, SMS or mobile phone, 5 (11%) respondents strongly agreed (use internet/web); 1 (3%) agreed (use internet/web) ; while 42 (86%) %) strongly disagreed (do not use internet/web).
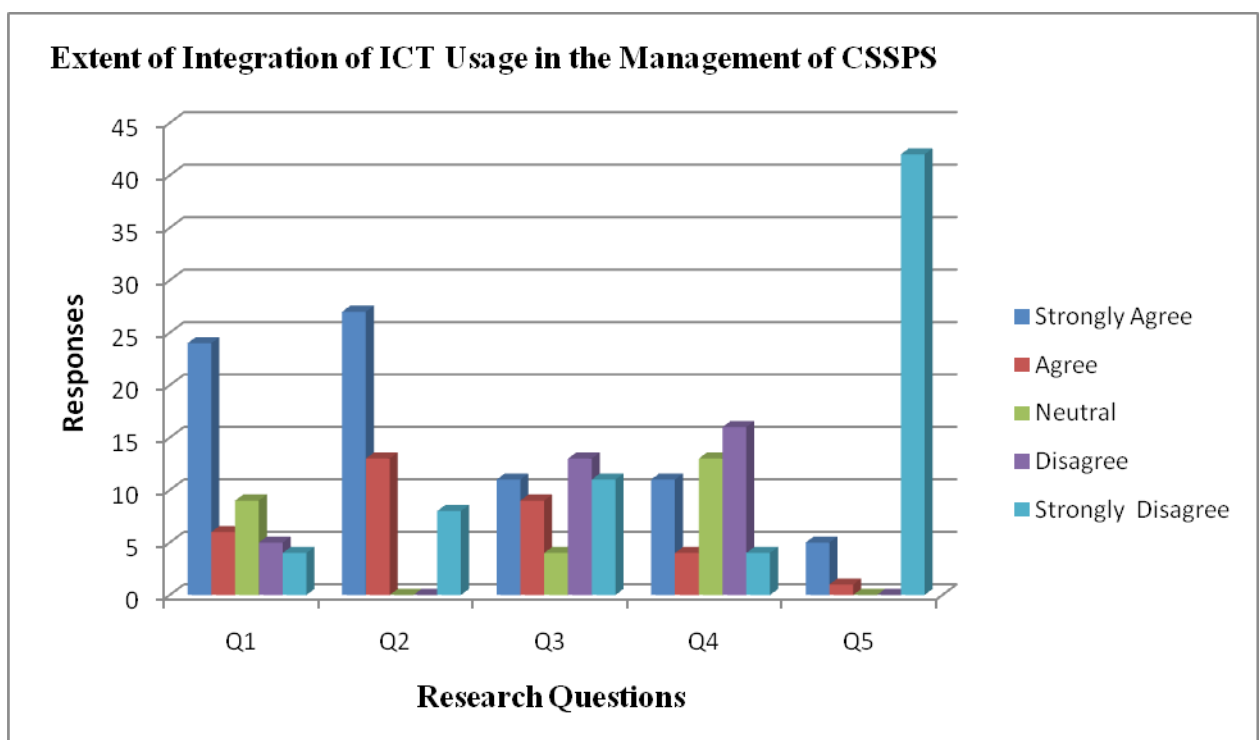
Figure 4.2 Chart of Frequency of ICT integration in Service delivery

These results show high levels of ICT readiness. The percentage of responses regarding the number trained on basic computer skills and accessibility to a computer at work place and/or at home indicated that most respondents have embraced usage of ICT. The high proportions that indicated that they were not offering services to the Pensioners through Internet/Web, SMS or mobile phone item could be due to the fact that Internet/Web, SMS or mobile phone services were not yet fully integrated as a means of rendering service to the pensioners.

4.2 Usage of ICTs on enhancing service delivery

Responses related to the usage of ICTs on enhancing service delivery in civil service staff pension scheme were arranged into five items; (1) The applications that offer end-to-end support for Pensions processing and Payment. (2) Pensions Department requires a comprehensive portfolio of technology, application and Business Process Re-engineering. (3) A fully integrated enterprise wide software application is needed for efficient and effective service delivery. (4) E-Services such as web/Internet, SMS and mobile access to pensions services will improves service delivery to pensioners and (5) functions that is prefer computerized in Pensions Department. The number of respondents responding on the scale of strongly agree, agree, neutral, disagree and strongly agree are represented in table 10.

A total of 48 responses from 48 respondents were received and analyzed as shown below:-

Table 4.6 ICTs on enhancing Service Delivery

		Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
		F	%	F	%	F	%	F	%	F	%
Q1	You have an application that offers end-to-end support for Pensions processing and Payment?	0	0	0	0	20	42	20	42	8	16
Q2	Pensions Department requires a comprehensive portfolio of technology, application and Business Process Re-engineering	17	36	15	31	13	27	3	6	0	0
Q3	A fully integrated enterprise wide software application is needed for efficient and effective service delivery	27	56	9	19	12	25	0	0	0	0
Q4	E-Services such as web/Internet, sms and mobile access to pensions services will improves service delivery to pensioners	25	52	13	27	10	21	0	0	0	0
Q5	What functions would you prefer computerized in Pensions processing	32	67	11	22	5	11	0	0	0	0

As shown from the table, 42% of the respondents were neutral (not sure) on whether there existed an application that offers end-to-end support for Pensions processing and Payment; while58% of the respondents strongly disagreed and/or disagreed that there was an application that offer end-to-end support.

A total of 36% of the respondents strongly agreed and 31% agreed that Pensions Department requires a comprehensive portfolio of technology, application and Business Process Re-engineering consequently making a cumulative total of 67% respondents that agrees there is need. 27% of the respondents were neutral (not sure whether the department requires that Pensions Department requires a comprehensive

portfolio of technology, application and Business Process Re-engineering; and only6% of respondents disagreed.

On the need for a fully integrated enterprise wide software application for efficient and effective service delivery: - a cumulative total of 75% respondents agreed there is need while 25% were neutral (not sure).

A cumulative percentage of 79% of respondents agreed that E-Services such as web/Internet, SMS and mobile access to pension's services would improve service delivery to pensioners while 21% were neutral (not sure).

A cumulative total of 89% respondents agreed that they would like to see all functions of pensions processing computerized while only 11% were not sure (neutral)
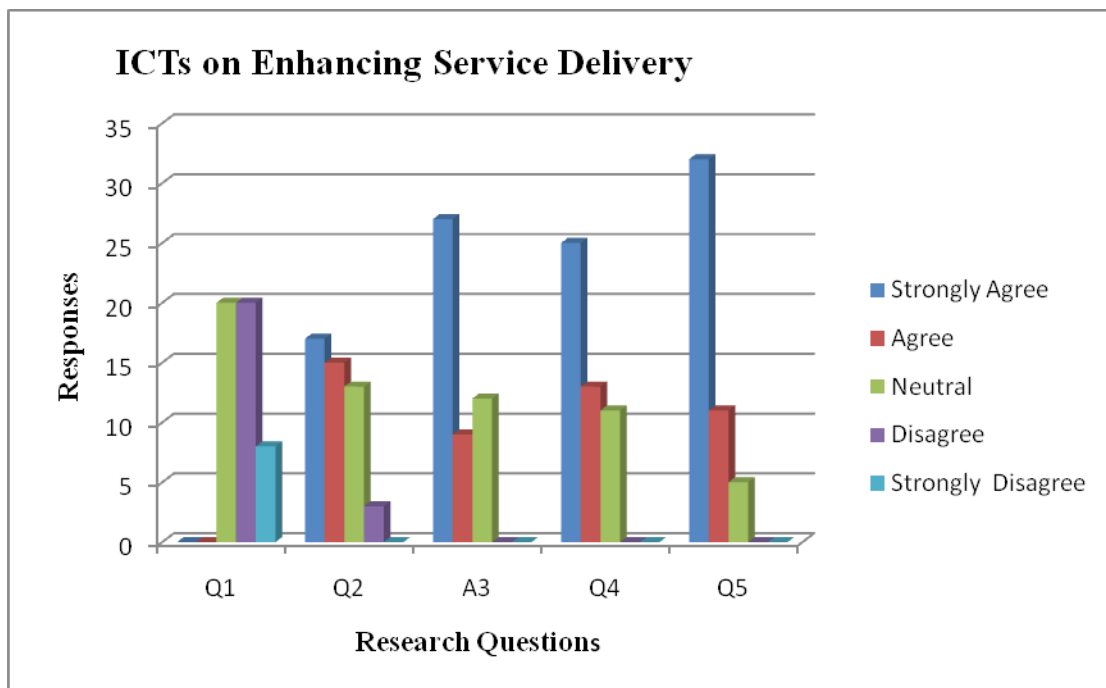
Figure4.4: Chart on frequency against questions on service delivery

These results show high levels of respondent's acceptance of the usage of ICTs in enhancing service delivery of civil service staff pension scheme. The positive

responses regarding this item indicated that most staff in Pensions Department has embraced the use of ICT.

From these results, it is clear that the proportion of agreements to the item is bigger than the proportion of disagreements. This indicates that most of the respondents hold the Civil the usage of ICT system in high regard. These findings clearly indicated the backing of the staff interviewed to embrace the use of ICT.

4.3 Role of ICTs in enhancing the security of Pensions Systems

The role of ICTs in enhancing the security of Pensions Systems was captured through the sampled respondent's responses on the four items; (1) you have an ICT security policy and data protection policy in Pensions Department and the staffs are familiar with the contents. (2) Intrusion detection and prevention is lacking in the pensions processing and sharing of data. (3) You have a business continuity plan in case of a disaster. (4) You use login password when logging in to use computer or any other application in Pensions Department. Table 11 presents the frequency distribution of the responses. A total of 36 responses from 36 respondents were received and analyzed as shown below:-

Table 4.6: Observations – Security

		Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
		F	%	F	%	F	%	F	%	F	%
Q1	You have an ICT security policy and data protection policy in Pensions Department and the staffs are familiar with contents?	0	0	3	6	8	17	10	21	27	56
Q2	Intrusion detection and prevention is lacking in the pensions processing and sharing of data?	23	47	9	19	11	22	1	3	4	9
Q3	You have a business continuity plan in case of a disaster?	0	0	0	0	3	5	40	84	5	11
Q4	You use login password when logging in to use computer or any other application in Pensions Department?	9	19	8	17	3	6	24	50	4	8

Only 5% agree that there was an ICT policy in the department; 17% of the respondents were not sure while a cumulative total of 78% of the respondents disagreed that there existed an ICT security policy.

A cumulative total of 66% agreed that intrusion detection and prevention is lacking in the pension processing and sharing of data; 22% of the respondents were neutral or not sure while a total 12% of the respondents did not agree.

Regarding ICT offering business continuity plan in case of a disaster, cumulatively, 95% of the respondents disagreed that there existed one while 5% of the respondents were not sure (neutral).

On the use of login password when logging in computer or any other application in Pensions Department to ensure the security of Pensions Systems, a total of 58% respondents disagreed that they use password to login while 36% of the respondents

stated that they were using password to log into the systems and 6% were not aware whether they use password (neutral).
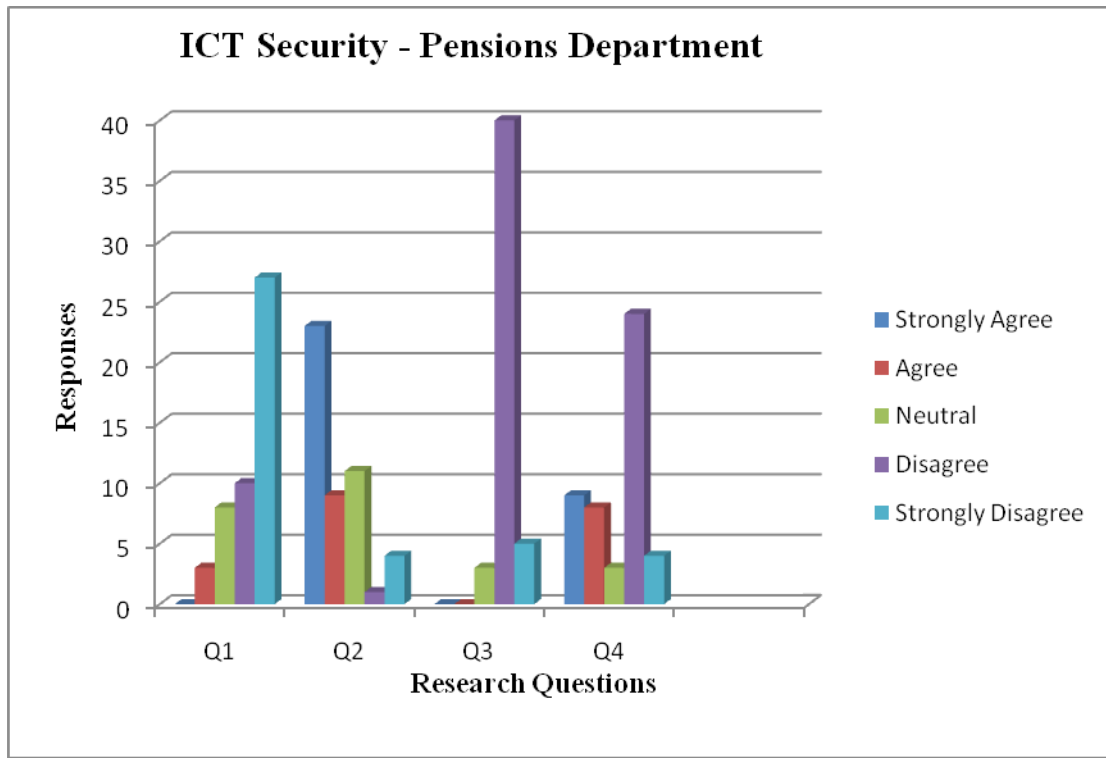
Figure 4.5: Chart of frequency against questions on ICT security

From these results, it is apparent that most of the respondents in this sample did agree that ICT as it's used in pensions department did not have appropriate security measures as envisaged in the Civil Service Staff Pension Scheme.

From these results, it is clear that the proportion of disagreements to the item is bigger than the proportion of agreements. This indicated that most of the respondents did not hold the Pensions Systems or ICT usage as secure or in high regard. These findings clearly indicated the disapproval of security rating or business continuity plan/disaster recovery in the existing usage of ICT in Pensions Department.

4.4 Challenges Hindering Effective use of ICTs in Managing Pensions Schemes

An examination of the questionnaires responses for each of the respondents included in the sample based on six key challenges hindering the effective use of ICTs for efficient civil service pension's management in Kenya shows that Thirty five percent (35%) of the staff pointed to the poor ICT infrastructure as the main challenge faced. Financial constraints as a factor hindering effective use of ICTs was twenty three (23%), High levels of illiteracy in ICT were also reported by 19% of the staff in the sample. Other notable challenges encountered include: frequent power disruptions (11%), frequent vandalism (6%), and limited to urban centers (6%). These are presented in figure 6
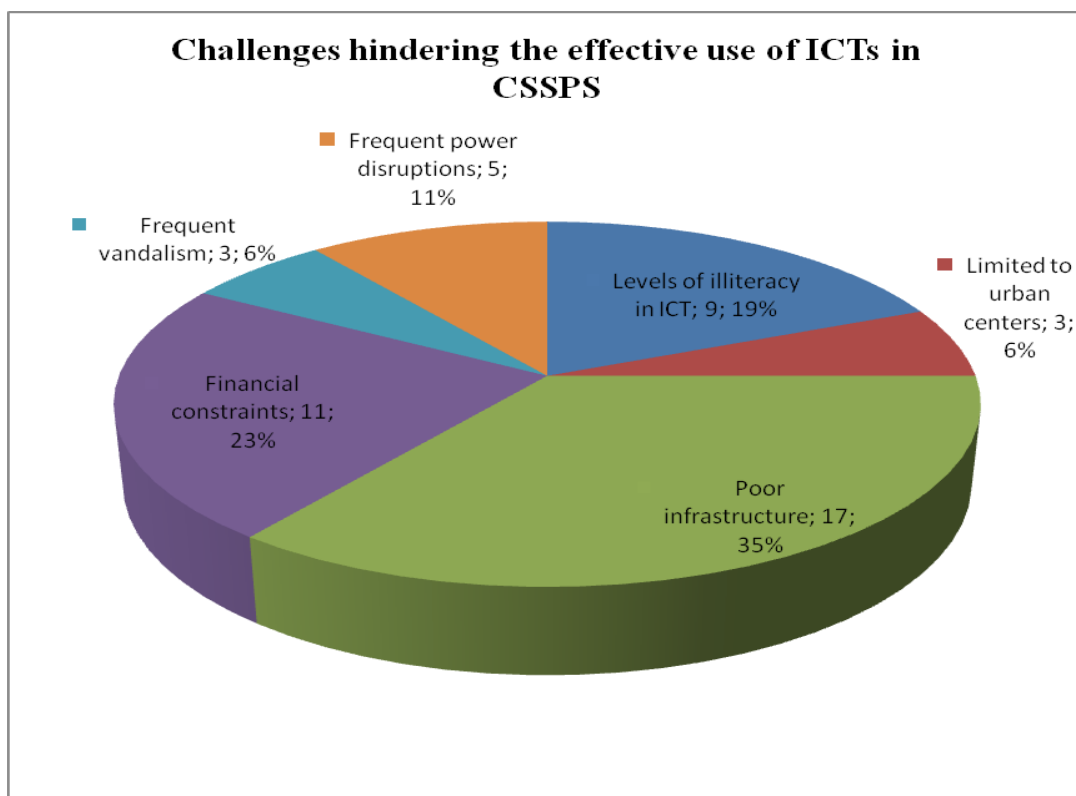
Figure 4.7: Factors that hinder effective use of ICTs in Pensions

4.5 Analysis of Suggested Strategies

Results on the examination of the questionnaire issues pertaining to the strategies to be adopted by CSSPS in order to address the challenges are shown figure 5 below the main strategies suggested were to acquire CSSPS ERP which is a comprehensive ICT solution for CSSPS (31% response) and improve ICT infrastructure (27% response). It also came out that:- to enhance capacity building (19%) and Sensitization campaigns (15%) were part of the key strategies suggested. Other strategy mentioned was adherence to the CSSPS ICT policy (8% response.).
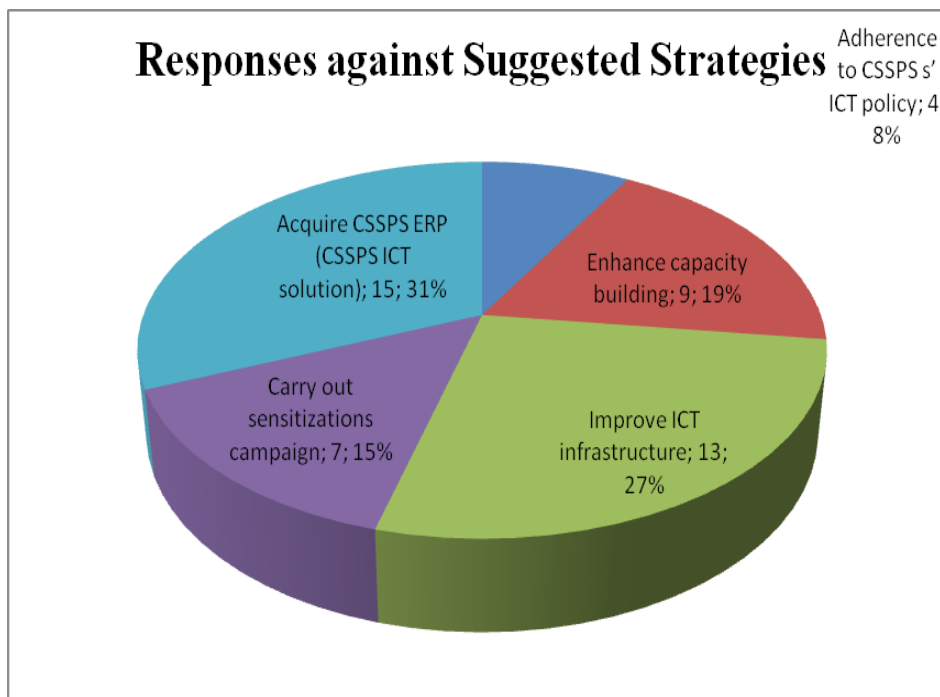
Figure 5.8: Response against suggested strategies

4.7 Chapter Summary

The chapter presented a summary of data presentation, analysis and interpretation. The analysis in this chapter was based on the quantitative data collected through questionnaires. It presents the results of analysis and the findings. Further discussion and recommendations based on the findings of this stage takes place in the final chapter.

In terms of non-response to the questionnaires, this did not seem to have a significant impact in this research based on the analysis.

CHAPTER FIVE

SYSTEM ANALYSIS, DESIGN AND DEVELOPMENT

5.0 Introduction

This chapter describes Systems Analysis, Design and Development. This chapter outlines the creation of the physical database, Program Construction/Coding, testing and Implementation.

5.1 Systems Analysis

5.1.1 Requirement Elicitation and Analysis

Requirements elicitation and analysis may involve a variety of people in an organization. The people involved in this process are referred to as stakeholders and consist of all the people interacting with or affected by the system (Somerville, 2007).

According to Somerville (2007), the general process model for elicitation and analysis consists of requirement discovery which is the process of interacting with stakeholders in the system to collect their requirements; requirement classification and organization which is the process that takes the unstructured collection of requirements, groups related requirements and organizes them into coherent clusters; requirement prioritization and negotiation which is the process that is concerned with prioritizing the requirements, and finding and resolving requirements conflicts through negotiation; and requirements documentation which is the process that is used to document all the requirements

The Researcher worked with the targeted team and interviewed them repeatedly to ensure that all the system requirements were gathered, analyzed and grouped appropriately before applying the modeling tools. This means that requirements were

gathered, validated, reviewed by the staff in Pensions Department before designing the system

5.1.2 Analysis of the Current System

The researcher collected the data relevant to this section through interviews, systems walkthroughs and demonstrations and used the ICT skills and knowledge to analyze the data.

5.1.2.1 Claims Processing

Pensions claims processing starts from the Ministry/Department where an officer works. The Ministry/Department completes standard pensions claim forms for the officers that are retiring from service. The forms captures the following information:- Employees personnel details, Employees Bank details, Employment history, Salary progression details, employees terms of service. In addition to the standard claim, the ministry has to mandatory attach the following documents:- letter of first appointment, letter of confirmation from probation, letters of promotion, last payslip and a copy of national Identity card. The standard claim forms used are named: - GP178, GP 179, GP 213 which are standard claim forms used for different types of claims. The claim form together with all the required documents is then submitted to Pensions Department where it's checked for correctness and the availability of the requirements before it can be accepted. When the claim is incorrect or any of the required documents is missing, the claim is queried and then it is sent back to the Ministry/Department where it originated from with comments on the reason for rejection.

5.1.2.2 Registration Process

All the accepted claims from the Ministry/Department are then received in a register and forwarded to the Registry Division of the Department for categorization based on the type of award and the terms of service before generation of Pension file number. The prefix of the pension number is determined by the type of award. Pensioner number therefore has alphabetical prefix followed by a numeric number. The table 1 below shows the type of award:-

Table 5.9: List of awards

Type of award	Reason/Cause of Retirement	Prefix	Terms of service
A	Retirement on age ground	APN/PC – Service more than 10 years APN/GC – Service less than 10years	Permanent and Pensionable
B	Retirement on abolition of office	APN/PC - Retrenchment	Permanent and Pensionable
C	Retirement on medical grounds	APN/PC – Service more than 10 years APN/GC – Service less than 10years	Permanent and Pensionable
E	Injury pension	JPN/PC – Inured while working	Permanent and Pensionable
F	Service Gratuity	APN/GC – Service less than 10 years	Permanent and Pensionable
H	Compassionate Gratuity	APN/GC – Temporary terms	Permanent but not pensionable
DG	Death Gratuity	APN/PC – Service more than 10 years APN/GC – Service less than 10years	Permanent and Pensionable
KD	Killed on Duty	KPN/PC – Killed while discharging duties	Permanent and Pensionable
PP	Parliamentary Pension	APN/PP - Service more than two parliamentary terms	Parliamentary term = 5 years
PR	Parliamentary Refund	APN/PR – Service less than two parliamentary terms	
PK	Presidential Pension	APN/PK – Service of more than two terms	

Source: Pensions Department (2012)

When a claim has been assigned a pension number it is then put into a physical folder

and forwarded for assessment where data is captured into a legacy computer system

and then assessed for calculation of retirement benefits.

5.1.2.3 Assessment Process

The assessment is done based on various variables such as:-

Qualifying service - defined as the total number of completed months from the date of employment to the date of retirement/withdrawal without any unauthorized break in service. It is taken into account when determining whether an officer qualifies for a pension or a gratuity. This period of service may not be all pensionable.

Pensionable service - total number of completed months worked excluding any period of absence without pay. This varies based on the type of employment, which is classified as temporary service, contract employment, probationary service or permanent employment. Each of these services can be defined and the corresponding computed period of pensionable service is as follows:-

- **Temporary employment:-**The period served as a temporary employee is termed as temporary service period. One half of the total temporary service period is considered as Pensionable service.

- **Contract employment:-**The period during which the employee served on contractual terms of employment is termed as Contract service period. The period of contractual service is not considered as pensionable service period, unless approval is granted for a refund of contract gratuity and conversion of the period into pensionable service.

- **Employment on Probation:-**The period during which the employee is on probationary service is termed as the probation period. The probationary service period is for 2 years. The probation period is considered for computing

Pensionable service only if the employment is further confirmed as permanent and pensionable.

- **Permanent employment:**-On completion of the probation period of service, the employee's service may be confirmed as permanent; in such case the employment is termed as permanent and pensionable. If the service is permanent, the whole service period including the probation period is considered as pensionable service.

- **Pension factor** is a constant used in computing pension and may vary from one service to another as shown in the table 2 below:-

Table5.8: Pensions Assessment Factors

Ministry/ Department	Pension Factor	Effective Date
Civil Services	1 / 600	Up to 20 – 5 – 82
Civil Services	1 / 500	w.e.f 21-5-82 up to 8 -12 - 94
Civil Services	1 / 480	w.e.f. 9-12-94 to date
Parliamentary	1 / 480	w.e.f 1-7-83 to date
Military	1 / 400	w.e.f 1-1-96 to date

Source: Pensions Department (2012)

Pensionable Emoluments (PE) - the last annual salary used for calculation of pension. An average of the last three years' salary will be used where an officer has been promoted or demoted during the period.

Pensions' assessment using the factors specified in the table 3 below:-

Chapter 5: Table 3: Pensions Computations – Extracted from various Pensions ACTs

TYPE OF AWARD	UNREDUCED PENSION	REDUCED PENSION	LUMPSUM	REMARKS
Normal Retirement Pension – Cap 189	(1/480* No. of Months * PE)	(¾* UR) per annum	¼*UR	Monthly Pension=RP/12 PE=Personal Emoluments UR=Unreduced
5yearsDependant Pension – Cap 189		(¾* UR) per annum		Payable to the widow monthly
Service Gratuity – Cap 189	(1/480 * No. Of Months * PE* 5)			Unreduced is paid as Gratuity There is no monthly for these cases
Death Gratuity – Cap189	(1/480* No. of Months * PE)		¼*UR *20	Death gratuity of an amount not exceeding twice the amount of a deceased Pensionable officer's annual Pensionable emoluments or his commuted pension gratuity whichever is greater is payable to the legal personal representative of the officer.
Refund Of Widows And Children Pensions Scheme	Refund = (Refund Interest Percentage (1.25%) * Total Contribution) + Total Contribution			Conditions for Refund:-Dismissal, resignation and retirement without dependants (wife and children)
Armed Forces Act –Cap 199 (MilitaryPension And Gratuity)	(1/400* No. of Months * PE)	(¾*UR)per annum	¼*UR	
Parliamentary Pension Act - Cap196	Pension = Pension Factor (1/300) * No. of Months * Salary Actual Pension = (Pension) * (100% - (5% * No. of Years less than 10))	Reduced Pension = 3/4 * Actual Pension	15*RP	This scheme is contributory at the rate of 12.67 % by the member and 25.34% by the Government.

Source: Pensions Department (2012)

The benefits determined which include lump sum and monthly pension are then certified by the Assessment Officer and authorized by the Kenya National Audit Office (KENAO) and then approved by the Directorate for payment.

5.1.2.4 Payment Process

When the pension has been approved for payment, a voucher is raised by the Accounts division for the payment of lump sum amount while a Pay Change Advice (PCA) is also raised to the payroll Division to load the monthly pension into payroll. The payment voucher goes through voucher examination, authorization and then a cheque is printed and signed by two Accountants who are enrolled as signatories to the Bank Account.

5.1.2.5 Payroll Process

The PCA sent to the Payroll division are extracted into a COMPAY form which is then keyed into a stand-alone computer system and then the data is transferred to the COBOL based main-frame system for monthly payroll runs.

5.1.2.6 Customer Care Process

The Public Relations (PR) Division forms a very important part of the Pensions Department. It interacts with pensioners, addresses their grievances, and keeps the pensioners informed about the various pension policies of the department. Awareness about the various pension policies and amendments is created among the public using different media such as Print media, Broadcasting and Website.

The pensioners bring forth their enquiries/complaints to the PR Division via media, Letters, phone calls and personal visits. These enquiries/complaints are logged with

the desk officer who retrieves the details of the Pensioner from the manual file. On retrieval of the details of the file, the desk officer establishes the status of the file and establishes a response on the issue raised by the pensioner.

In a case where the issue requires a detailed response from a certain division, the complaint details are recorded in a **"Complaints Register"** and the Desk Officer forwards it to the corresponding officer in the relevant Division based upon the type of complaint. An action on the file is initiated by the respective division and the Pensioner is informed / updated on the issue resolution. The issue details are noted as comments on the Pension File. Currently all these processes are handled manually.

5.1.3 Findings regarding the Current Systems

The current business processes were found to be manual, repetitive and involved so much paperwork and maintenance of manual registers. The claims received from Ministries/Departments are also accompanied with the officers' personal files which are used to authenticate if the claim is genuine and this leads to loss of essential documents from the files and sometimes misplacement of the files. Pension Numbers were manually generated and this was leading to duplication of records and also wrong categorization of awards.

There existed lack of consistency in the reports due to data duplication and use of multiple sources of data. The existing legacy systems were not integrated thus leading to human intervention and manipulation resulting incorrectness of data, loss of data integrity and delays pensions processing. Besides retirement benefits determination was also done manually and this resulted into cases of wrongly calculated pensions. The manual calculation also required too much paper work and movement, and a big number of staff to carry out the work.

The department did not have clear definition of roles and responsibilities in the divisions and even for individual staff leading to redundancy of some staff and over-engaging a few in the activities of the department.

The records in the department largely existed in manual format and hence it was difficult or time consuming and laborious to retrieve and/or update of pensioners records. The existing of records in paper form also affects the strategic planning of the department since it has problem in budgeting and expenditure control due to difficulty in retrieving data. Also, the accounting systems such as Bank Reconciliation, Cash management, Vote book Control (budgeting) and Ledger Management were manually done.

Customers queries were poorly responded to due to: - inadequacy information; receipt of complaints through mails was not even acknowledged and therefore pensioners were not updated on the status of their complaints; and complaints were not categorized it was not even possible to know frequently asked questions which could be posted in the website.

The current systems used in the department are not integrated and exist as islands of systems that do not have means of sharing data. The systems also run in multiple platforms such as Oracle, MS Access, COBOL, and MS Excel. Some of these platforms were obsolete and are no longer supported by the respective vendors. The systems did not have any security policy defined or implemented. In some cases the users were using the same login name and password to log into the system. The systems did not have audit trails to track changes that were taking place in the database or at the application level. The data in payroll system was not clean and was

incomplete missing essential details such as identity card number, date of birth and Pensions Effective date which were necessary for pension's management.

5.2 System Design

The second phase of SSADM is discussed in this section and this where the results of the System Analysis phase is used. The researcher modeled the user requirements into a logical design of the system and thereafter modeled the physical design through development of user interfaces structures and implement logical processes. This section covers the design of Technical Architecture (infrastructure), Application Architecture (Functions), Processes Architecture (Business Processes), Data Architecture (ERD), Physical database design (tables) and Physical Design.

5.2.1 Data Modeling Techniques

The Researcher used data modeling techniques to model an ICT solution. Normalization, data flow diagrams/Model (DFD) and entity relationship diagrams (ERD) were used to analyze the relationships between the processes and entities as well as in the presentation of findings.

The analysis focused on Inputs, Processes and Outputs within CSSPS and the following tools were used in modeling the requirements:-

Entity Relationship Modeling - The study involved the use of data modeling technique referred to Entity Relationship Diagram/Model since most large ICT systems and in particular this system required a Relational Database Management System (RDBMS). According to Somerville (2007), the most widely used data modeling technique is Entity-Relation-Attribute modeling, which shows the data entities, their associated attributes and the relations between these entities.

Besides, the study also involved identifying all the subsystems that exists in the pension's scheme management through the use of an architectural modeling which according to Somerville (2007) shows the principal subsystems that make up a system.

According to Date et al., (2006) the process of normalization was built around the concept of normal forms. It further states that a relation is said to be in a particular normal form if it satisfies a certain prescribed set of conditions which helps in avoiding data redundancy and hence improves data integrity. In this study normalization of CSSPS's entities and attributes was done to the third normal form to ensure that functional dependencies on non-key fields were eliminated.

5.2.2 Technical Architecture

The analysis of the infrastructure found that although there is both Local Area Network and Wide Area Network, the legacy applications deployed in the department do not make use of this infrastructure and they exist as islands and do not share data seamlessly. Human interface exist between systems in order to transfer data from one system top another and also to carry out some functions manually. Also, the hardware used in the department was found to be inadequate in capacity and systems were installed in personal computers instead of servers. There was no disaster recovery or backup procedure in place.

The envisaged platform proposed for CSSPS is a wide area network (WAN) environment. The system will be required to be installed in three sites namely the primary site, secondary site and the disaster recovery site to ensure a high percentage of availability and also take care of business continuity in case of a disaster.

The primary and secondary sites proposed should be located in different building blocks situated few kilometers apart while the disaster recovery site should be located in another town located several kilometers away. The network infrastructure should be based on secure data transmission channels with enough bandwidth and must have firewalls installed so as to ensure secure access. The software installed in all the sites should enable data replication and mirroring of data and common storage.

The system installed in each site will have three-tier architecture with Database Server, Application Server and Client. The two servers are required to have fail-over functionalities so that when one server fails both the application and database should be able to failover to one server.
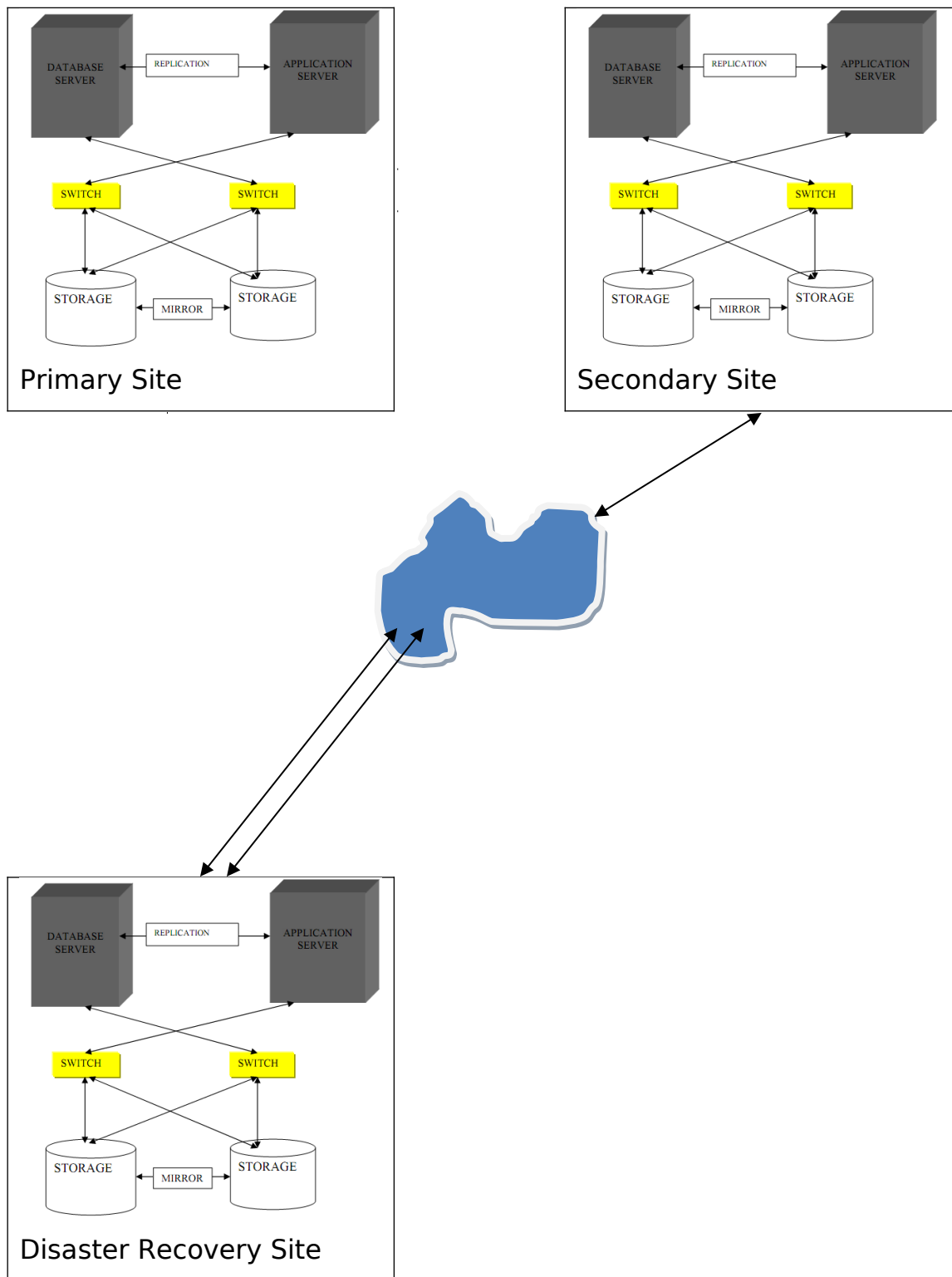
Figure 5.7: Proposed Technology Architecture (Infrastructure)

5.2.3 Application Architecture

The application is designed to cover all the functionalities of the Pensions Department. In addition to functional requirement the design takes into consideration other system features such as workflow management, Security features, ease of use and flexibility.

Table 5.9: Modules of the CSSPS

Modules	Functional Area
Employee	Captures employees details
Claims	Verifies all incoming claims for duplication through the use of key fields; and confirms the existence of all mandatory documents
Registration	All the data in the claim form is uploaded or captured into the system; and files categorized automatically based on the guidelines setup in the system and pension numbers generated
Assessment	All calculations done based on the formulae setup in the system; and all the approvals done based on the workflow defined in the system
Accounts	Voucher preparation, approval as defined in the workflow and payment made through Electronic Funds Transfer (EFT)
CRM	Pensioner's Enquiry; and Web/SMS access to pensioners
Payroll module	Pension increase/change, bank details changes and approvals done
Systems Administration	User creation and password assignment; Mapping of users to various roles

5.2.4 Process Architecture

The tool used in this process design was Data Flow Diagrams (DFD). Dates et al., (20081) defines Data Flow Diagram as the graphical representation of the processes and the flow of data among them. A data flow diagram illustrates the processes, data stores, external entities and the connecting data flows in a system. It is a common practice to draw a context-level Data Flow Diagram first which shows the interaction

between the system and outside entities. This context-level DFD is then "exploded" into a detailed DFD.

There are four components for a Data Flow Diagram. They are-:

External Entities/ Terminators are outside of the system being modeled. They represent where information comes from and where it goes. These are represented by rectangles

Processes, usually represented by an ellipse (circle), which modify the input to generate the output.

Data Stores represents a place in the process where data rests. This is represented by an open-ended rectangles or a cylinder symbol.

Data Flows, represented by arrows, are how data moves between terminators, processes, and data stores

Data flow diagram shows the system boundaries, external entities that interact with the system and the information flows between the entities and the processes. The Data flow diagram is used to represent the system with its generic three level context diagram i.e. Level 0, 1 and 2.

Level 0 Context Diagram: A data flow diagram in which the system is represented by a single process and showing the main external entities that interact with the system, showing the main data flows between the system and the external entities. It only contains one process node (process 0) that generalizes the function of the entire system in relationship to external entities.

Data Flow Diagram - Context Level 0
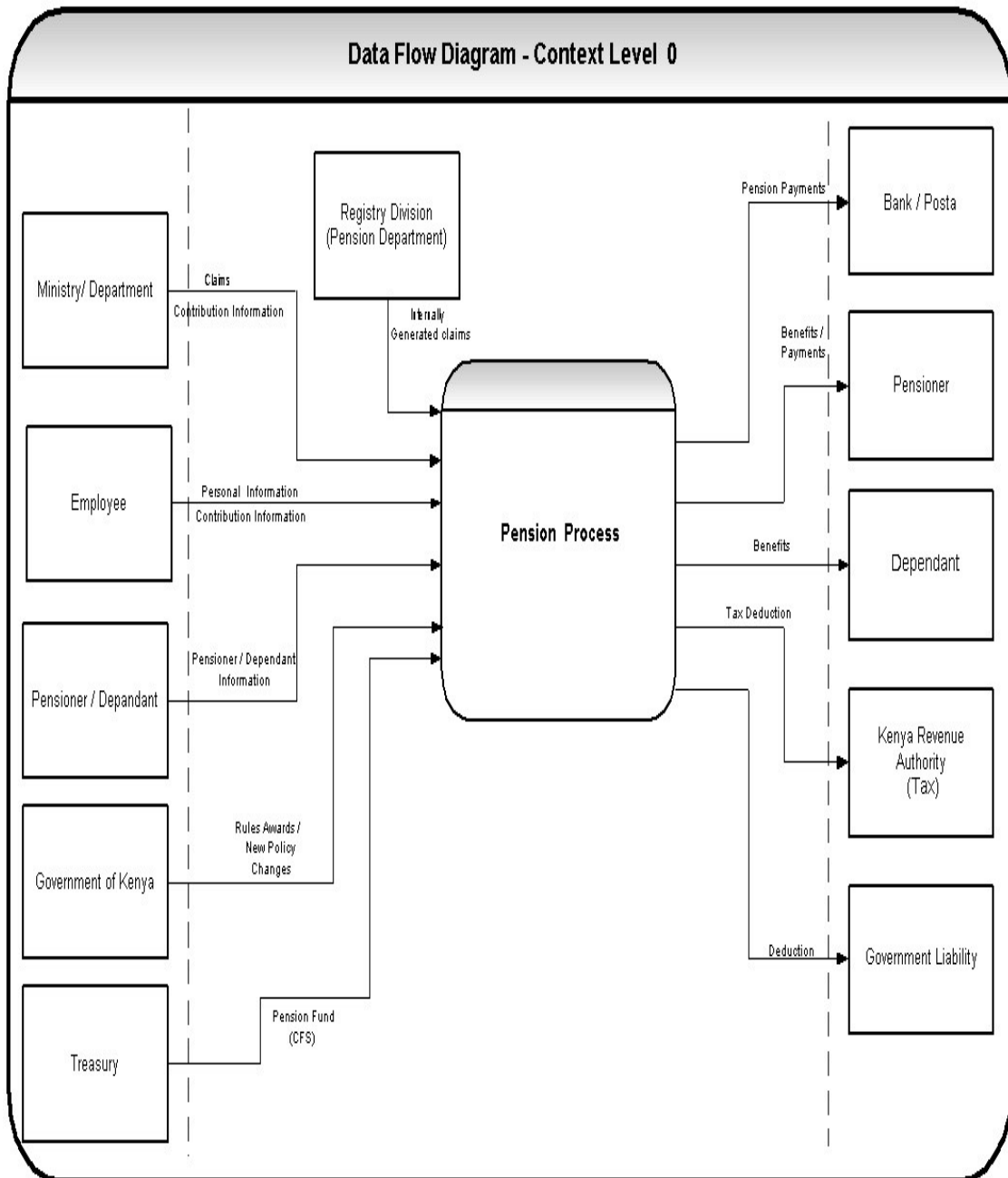
Chapter 5: Figure 2: Context Analysis Diagram level 0

5.2.5 Data Architecture

This part of design depicts the data that is used in the system. Entity Relationship Diagrams (ERD) and data dictionary are used in this case. Entity Relationship Diagram is widely used data modeling mechanism that helps to organize the data into entities and define the relationships between the entities. This process has proved to create a good database structure so that the data can be stored and retrieved in a most

efficient manner. By using a graphical format it will help communicate about the design between the designer and the user and the designer and the Implementation team who will implement or deploy the system.

An ERD typically consists of four different graphical components:-
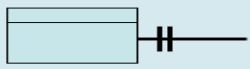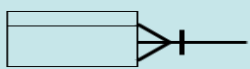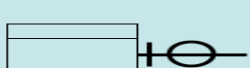
1. Entity - A data entity is anything real or abstract about which we want to store data. Entity types fall into five classes: roles, events, locations, tangible things or concepts. E.g. Employee, Claim, Payment and Payroll. All the Entities are represented in a Rectangle box and appropriately named.

2. Relationship - A data relationship is a natural association that exists between one or more entities. E.g. Ministry or Department forwards Claims. Relationships between the entities are represented using Diamond box and lines.

3. Cardinality - Defines the number of occurrences of one entity for a single occurrence of the related entity. E.g. Ministry/Department may forward one or many claims. Also Claims are received from one or more ministries. The cardinality of a relationship can only have the following values

- One and only one
- One or many
- Zero or many
- Zero or one

The cardinality relationship is symbolically represented as follows.

Symbol	Meaning
	One and only one
	One or more
	Zero or more
	Zero or one

Chapter 5: Figure 3: Symbols denoting the cardinality of relationship

4. Attribute - A data attribute is a characteristic common to all or most instances of a particular entity. Synonyms include property, data element and field. E.g. Name, Address, Pension Number, Bank Details are all attributes of the entity Pensioner. An attribute or combination of attributes that uniquely identifies one and only one instance of an entity is called a primary key or identifier. E.g. Pension Number is a primary key for Pensioner. Attributes of an entity is described in an oval shape connector associated with the entity or the entity rectangle box itself compartmentalized to hold the attributes/properties details. The following ER Diagram symbolically represents conceptualization of the Entity Relationship Diagram model used in this system design.
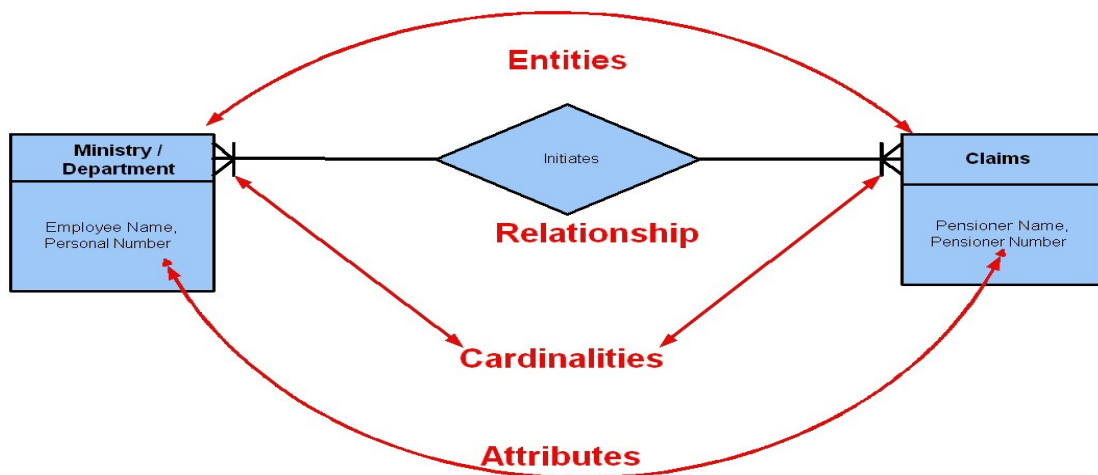
Chapter 5: Figure 4: Entity Relationship Diagram (Many-to-Many)

Identification of Entities in the Pensions System

First and foremost activity in ER modeling for any system is to identify all the global entities within the system scope. In general there are certain Internal and External entities that form part of the system. The following are the indicative lists of Internal and External entities:-

• Internal Entities: -Pensioner, Claims, Assessment, Payment, Payroll

- External Entities:- Ministry / Department, Employee, Claims, Bank, KRA (Kenya Revenue Authority)

CSSPS SYSTEM - Entity Relationship Diagram

Claim
- claim_no(pk)
- personal_number(fk)
- date_received
- claim_status
- remarks

Assessment
- Pensioner_no(pk)
- Assesment_date(pk)
- remarks

Award
- type(pk)
- descr

Bank
- bank_id
- bank_code(pk)
- bank_name
- branch_code(pk)
- branch_name

Employee
- personal_number(pk)
- surname
- firstname
- middlename
- ministry_code(fk)
- birth_date
- employment_date
- retirement_date
- gender
- marital_status
- idno
- death_status
- death_date
- death_cert_no
- pin
- tos
- last_sal

Employer
- code
- ministry_name
- box_no
- postal_code
- town
- telephone
- email

Payroll
- pensioner_no(pk/fk)
- payroll_date(pk)
- monthly_pension
- arrears
- tax

Pensioner
- pensioner_no(pk)
- personal_number(fk)
- surname
- firstname
- middlename
- ministry_code
- birth_date
- employment_date
- retirement_date
- enrolled_date
- gender
- marital_status
- idno
- death_status
- death_date
- death_cert_no
- pin
- tos
- last_sal
- award_type
- status

Pensioner_bank
- pensioner_no(pk)
- bank_code(pk/fk)
- branch_code(pk/fk)
- account_number(pk)
- effective_date
- end_date
- active

Enquiry_Category
- code
- descr

Payment
- pensioner_no
- voucher_no
- voucher_date
- lumpsum
- tax
- coa
- pay_date
- pay_status

Enquiries_log
- pensioner_no
- enquiry_time
- category
- details

user
user_id
lastname
middlename
firstname
password
role

roles
role_id
descr
admin
hr
claim_new
claim_edit
claim_delete
claim_accept_reject
claim_register
assesment
accounts
payroll
crm

Chapter 5: Figure 5: Global Entity Relationship Diagram

The Entity Relationship Diagram (ERD) shows the Entities and their relationship. This ERD represents the Global picture of CSSPS entities and their relationships. In Relational Database model, each of the entities including the associate entities are transformed into tables

5.2.6 Data Dictionary

Data dictionary is also used in this study to represent table layout. Primary key (PK) is unique identifier of the table or entity while foreign key (FK) references another table and therefore shows the relationship. Where one key cannot be used, a number of keys are used to uniquely identify the entity and therefore referred to as composite key. Unique key (UK) is one that stores unique values in the table but are not necessarily Primary keys.

EMPLOYER

Field	Type	Null	Default	Comments
Code	varchar(3)	No		
Ministry_name	varchar(20)	Yes	*NULL*	
Box_no	bigint(20)	Yes	*NULL*	
Postal_code	varchar(6)	Yes	*NULL*	
Town	varchar(20)	Yes	*NULL*	
Telephone	varchar(16)	Yes	*NULL*	
Email	varchar(30)	Yes	*NULL*	

Indexes:

Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	Code	0	A		

-- --

-- Table structure for table `employer`

CREATE TABLE IF NOT EXISTS `employer` (

  `code` varchar(3) NOT NULL,

  `ministry_name` varchar(20) default NULL,

  `box_no` bigint(20) default NULL,

  `postal_code` varchar(6) default NULL,

  `town` varchar(20) default NULL,

`telephone` varchar(16)defaultNULL,

`email` varchar(30)defaultNULL,

PRIMARYKEY (`code`)

) ENGINE=MyISAM DEFAULT CHARSET=latin1;

PAYMENT

Field	Type	Null	Default	Comments
Pensioner_no	varchar(15)	No		
Voucher_no	bigint(20)	No		
Voucher_date	date	Yes	*NULL*	
Lumpsum	float	Yes	*NULL*	
Tax	float	No	0.15	
Coa	varchar(20)	Yes	*NULL*	
Pay_date	date	Yes	*NULL*	
Pay_status	varchar(10)	No	Unpaid	

Indexes:

Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	Pensioner_no	0	A		
				Voucher_no	0	A		

The script below was used to create the table designed above.;

-- Table structure for table `payment`

CREATETABLEIFNOTEXISTS `payment`(

 `pensioner_no` varchar(15)NOTNULL,

 `voucher_no` varchar(10)NOTNULL,

 `voucher_date` datedefaultNULL,

 `deduction` floatdefaultNULL,

 `lumpsum` floatdefaultNULL,

 `tax` floatdefaultNULL,

 `coa` varchar(20)defaultNULL,

 `net_amount` floatdefaultNULL,

PRIMARYKEY (`pensioner_no`,`voucher_no`)

) ENGINE=MyISAM DEFAULT CHARSET=latin1;

More Database tables and the scripts coded in the creation of the tables are shown in Appendix C and Append D respectively.

5.3 Software Development Methodology

Today there are several standard practices for software development, ranging from traditional practices such as the Waterfall model to recent methods such as agile programming Methodology, Prototyping, Extreme Programming (XP). The common theme for most development methods are that they have a clearly defined customer that will use the software, and that the software should be designed to meet their needs and requirements. In my case with developing CSSPS software, my potential customer is the staff in Pensions Department who manages pensions in the Civil Service. The basic goal of using these goals is to improve on the product quality and also to reduce the time taken to develop a product. The developer therefore preferred the use of iterative prototyping methodology since the other methodologies such as agile and extreme requires a large team of programming handling the development project.

5.4 Development Tools

The choice of the development tools was based on a number of issues and the researcher/developer opted to use Open Source Software tools due to its inherent advantages over proprietary commercial software tools. Hippel and Krogh, (2003) defines Open Software as Software that is made free. However, open source development models, which produce open source software, are defined as a process of software developers who voluntarily collaborate to develop software that they or their organization's need.

Some of the benefits that motivated the developer to use open source as outlined by Hippel and Krogh (2003) are:-

Lower software costs—Open source solutions generally require no licensing fees. The logical extension is no maintenance fees. The only expenditures are for media, documentation, and support, if required.

Simplified license management—obtain the software once and install it as many times and in as many locations as you need. There's no need to count, track, or monitor for license compliance.

Lower hardware costs—In general, Linux and open source solutions are elegantly compact and portable, and as a result require less hardware power to accomplish the same tasks as on conventional servers (Windows, Solaris) or workstations. The result is you can get by with less expensive or older hardware.

Scaling/consolidation potential—Again, Linux and open source applications and services can often scale considerably. Multiple options for load balancing, clustering, and open source applications, such as database and email, give organizations the ability to scale up for new growth or consolidate to do more with less.

Ample support—Support is available for open source which is often superior to proprietary solutions since open source support is freely available and accessible through the online community via the Internet. Also, many technological companies are now supporting open source with free online and multiple levels of paid support.

Escape vendor lock-in—Frustration with vendor lock-in is a reality for all IT managers. In addition to ongoing license fees, there is lack of portability and the inability to customize software to meet specific needs. Open source exists as a declaration of freedom of choice.

Unified management—Specific open source technologies such as CIM (Common Information Model) and WBEM (Web Based Enterprise Management) provide the capability to integrate or consolidate server, service, application, and workstation management for powerful administration.

Quality software—Evidence and research indicate that open source software is good stuff. The peer review process and community standards, plus the fact that source code is out there for the world to see, tend to drive excellence in design and efficiency in coding.

5.5 Physical Database Design

This is the section where the database tables were created. The logical design described earlier was converted into the physical tables by using database management tools.

5.5.1 Database Management Tools

The developer used a Relational Database Management System (RDBMS) which enables tables, relationships and the use of Structured Query Language (SQL). MySQL which is open source software and does not require licensing was therefore used. It is a software package that enables the creation, maintenance and management of database. It is also a Structured Query Language based and client/server relational database.

Some of the terms used in MySQL Server that describes a fundamental part of the architecture of the Database tool are:-

Database: A database is a storage place for data. The user runs an application that accesses data from the database and presents it to the user in an understandable format.

Relational Database: There are different ways to organize data in a database but relational database is one of the most effective. Relational database systems are an application of mathematical set theory to the problem of effectively organizing data. In a relational database, data is collected into tables (called relations in relational theory).

Structured Query Language (SQL): There are several different languages that can be used to manipulate relational databases. The most common of the languages is SQL. The American National Standards Institute (ANSI) and the International Standards Organization (ISO) have defined standards for SQL. Data within a database can be retrieved via SQL that is based on Relational Algebra.

Client/Server: In a client/server system, the server is a relatively large computer in a central location that manages a resource used by many people. When individuals need to use the resource, they connect over the network from their computers, clients, to the server.

MySQL's specific design goals were speed, robustness and ease of use. To improve the performance, MySQL was made as a multithreaded database engine. A multithreaded application performs many tasks at the same time as if multiple instances of that application were running simultaneously. Multithreaded applications have a lower overhead cost, when compared with multi processed databases.

Being multithreaded, MySQL has many advantages. A separate thread handles each incoming connection with an extra thread that is always running to manage the connections. Multiple clients can perform read operations simultaneously, but while writing, only the clients that need access to the data being updated are held. Even though the threads share the same process space, they execute individually. Because of this separation, multiprocessor machines can spread the thread across many CPUs as long as the host operating system supports multiple CPUs. Multithreading is the key feature to support MySQL's performance design goals and this is the core feature around which MySQL is built.

CSSPS database was created as a container that contains tables, queries, procedures and triggers. Database security was also implemented during the database creation and the tables created had primary keys, foreign keys and indexes clearly defined and created to ensure database integrity and referential integrity. All the database tables were created as defined in the physical database design section earlier.

5.6 Program Construction/Coding

This section describes how the researcher coded the computer instructions. The researcher relied on the systems analysis and design stages and also consulted the subject matter experts during the development of the CSSPS prototype. The actual construction of the system was done at this stage where the application was constructed by converting the logical design of the system into a physical system. The components of the system developed included menus; data capture Screens (forms); Reports; and queries/procedures and implementation of business rules. This stage also involved integrating the modules and implementation of the necessary security rules. The methodology used in this stage was iterative enhanced prototyping model which allowed the developer to review the work done with the users.

5.6.1 Prototyping

The researcher developed the product through an iterative prototyping. In this methodology the product went through various stages repeatedly to be refined before being finalized. The users were closely involved in the review of the product at various stages and their inputs were used to refine the product.

Verner et al, (1995) describes prototyping as a primary aid to building the right software product by simple process of having more than one-go at it and learning from the mistakes. So the main focus of prototyping in this case study was to ensure that both users and developer understood system requirements through requirements elicitation and validation, whereby users experimented with prototypes and consequently any errors or requirement omissions were revealed to the developer for correction and enhancements. The subject matter experts were therefore involved in the testing and reviewing CSSPS prototype until it was fully developed into a final product. The developer/researcher therefore worked closely with the users through iterative enhanced prototyping methodology to build the CSSPS.

In this methodology the requirements were gathered then the system was designed and followed by building of a prototype which was then evaluated by the user. After the user evaluation the product was then refined and a new design developed where necessary to incorporate the users views. This process was repeated until refined and acceptable product was produced which was then tested before implementation.

The process used is shown below:-

.
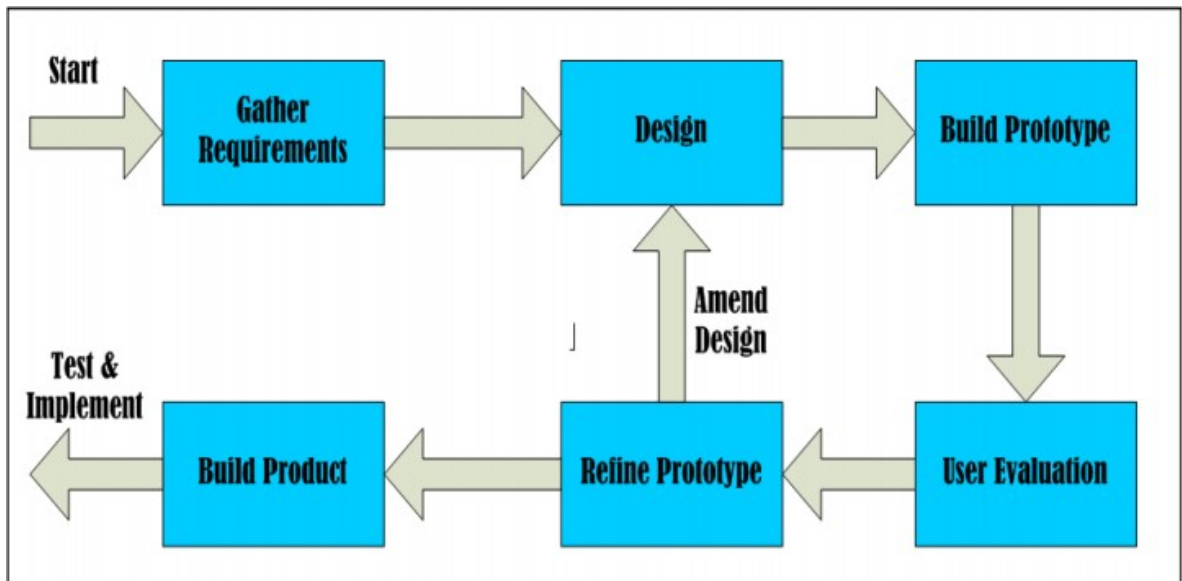
Chapter 5: Figure 6: Iterative Enhanced Prototyping Model

The developer/researcher was motivated to use prototyping due to its inherent advantages such as reduction in speed of delivery given that several phases can be conducted simultaneously; increased accuracy of the system due to the active participation of users during the development which provides constructive feedback on the errors detected to the developer; and enhanced user satisfaction due to their involvement (Verner, Tate and Braven, 1995). In this study the researcher involved the subject matter experts in reviewing all the stages of the development.

During the development the logical screen designs and interfaces were constructed into physical screens and tested. Besides, all the procedures, triggers and integration interfaces were coded and tested. This exercise was iterative as the prototypes were produced and reviewed by the selected users based on their areas of expertise to ensure that they meet the requirement specifications. Each prototype was refined after the user evaluation and then finally developed into a final product.

In the development of CSSPS, the developer/researcher used a modular approach to ensure that full attention of the subject matter expert in the given functional area was received. The main modules developed were: -claims, registration, assessment, accounts, CRM, Payroll and system administration. During development various types of testing were used which included testing by the developer himself and testing done by the system users. Each unit of code was tested for functionality and syntax errors by the developer while the users tested the system for functionality, integration and security.

The developer implemented a password security policy that requires a login name and password to access the application. The password policy was a combination of texts, numbers and special characters of not less than eight characters and is renewable after six (6) months. This policy was also tested by the users and the developer to ensure compliance. The roles were also created and tested accordingly to ensure that a user only accesses the modules according to his/her role.

Although the users were involved in the development, the developer still faced challenges during the construction since they considered the development of this application as an additional workload to their daily tasks. It also became very difficult to control the scope of the system and freeze user requirements since the users kept on coming up with new requirements during the prototyping.

5.6.2 Application Development Tools

These are the software tools that were used for coding and creation of screens. The developer used a server-side technology based tool ASP.NET for creating dynamic web pages and interactive CSSPS web applications. Although ASP.NET has full-fledged programming languages supported by .NET such as C#, PHP, VB.NET and Java, the developer narrowed to the use of VB.NET and PHP as the programming languages and implementation of CSSPS.

According to Mathew MacDonald, (2002) ASP.NET is a library of classes designed to handle Hypertext Transfer Protocol (HTTP) requests. In addition to a class library, it also includes several Internet Information Service (IIS) components for managing requests. An ASP.NET page is an HTML page that contains server-side scripts that

are processed by a web server before being sent to the user's browser. Applications developed using ASP.NET is compatible to MySQL database.

Internet Information Services (IIS), is a group of Internet servers including a Web or Hypertext Transfer Protocol server and a File Transfer Protocol server. IIS is Microsoft's product to compete in the Internet server market that is also addressed by Apache, Sun Microsystems/Sun Java System Web Server (King, et al, 1999)

IIS is described as a place where web application or Website can be hosted and accessed with intranet or with the help of internet MacDonald, (2002). One can also set security for a particular Website for specific Users and Computer in order to protect it from unauthorized access. IIS therefore means that you can publish WWW pages and extend into the realm of ASP (Active Server Pages) whereby JAVA or VBscript (server side scripts) can generate the pages on the fly. IIS has fun things like application development environment (FrontPage), integrated full-text searching (Index Server), multimedia streaming (NetShow), and site management extensions.

5.7 Implementation

In this stage the developed system and database are installed in the production environment, and other activities are conducted to ensure that the system operates and can be used effectively during production. Some of the most significant activities of this stage normally include:- training of system users, operators and other affected personnel which was not done in this case since the prototype was not configured for the production environment; converting data from existing automated and manual legacy systems and databases into the new system and this was partly done in order to build the content of the database; conducting acceptance testing of the system; and preparation of the production environment and installation of the system which was not done for this case due to the nature of the project.

This stage is dependent on the results of the earlier stages of SDLC. In this research, the developer availed CSSPS Prototype to Pensions Department as a model to be used in the development of an enterprise-wide Civil Service Staff Pensions Scheme application and also recommended the operating platform and Network Infrastructure. The researcher, however, implemented CSSPS in the development environment.

5.7.1 Implementation Technologies

To implement any web-based application a web server is required. According to Mathew MacDonald, (2002), a web server is a piece of software that manages web pages and makes them available to a browser such as Internet Explorer or Mozilla Firefox via a local network or over the Internet. The web server can be accessed remotely or locally. There are many web servers available such as Apache, Internet Information Services, and Netscape Web Server and so on.

By typing a URL (Uniform Resource Locator) into the address box of the browser the communication between a browser and a web server is started. Each conversation consists of two pieces: a **request** for information from the browser software; and a **response** from the server addressed by the URL. The principle of communication between a client and a server is composed of successions of requests and responses.

CSSPS was therefore developed using ASP.NET and hosted in IIS on Windows XP platform. In this application the user types **http://localhost88/cssps** into the URL to get access to the application. The application can be accessed by use of a browser like Internet Explorer, Mozilla Firefox among others.

The technologies used in the development and implementation of CSSPS application consists of client-side software such as browsers, server-side software such as IIS, the web pages development software PHP, MySQL as the database and Windows XP as the operating system platform.

5.7.2 Application

The system was designed based on a three-tier architecture which is used by many web applications. Three-tier architecture includes a presentation layer which allows user interaction with the system, Application layer where business rules/ logic are defined, and the database layer which stores the data used in the system.

The three-tier architecture is generally used when an effective distributed client/server design is needed that provides: - increased performance, flexibility, maintainability, reusability and scalability which form the non-functional features of a system. This model hides the complexity of distributed processing from the user. These features have made the three-tier architecture a popular choice over the two-tier architecture for Internet applications (Meier et al, 2003)

CSSPS was conceptualized in the diagram below:-
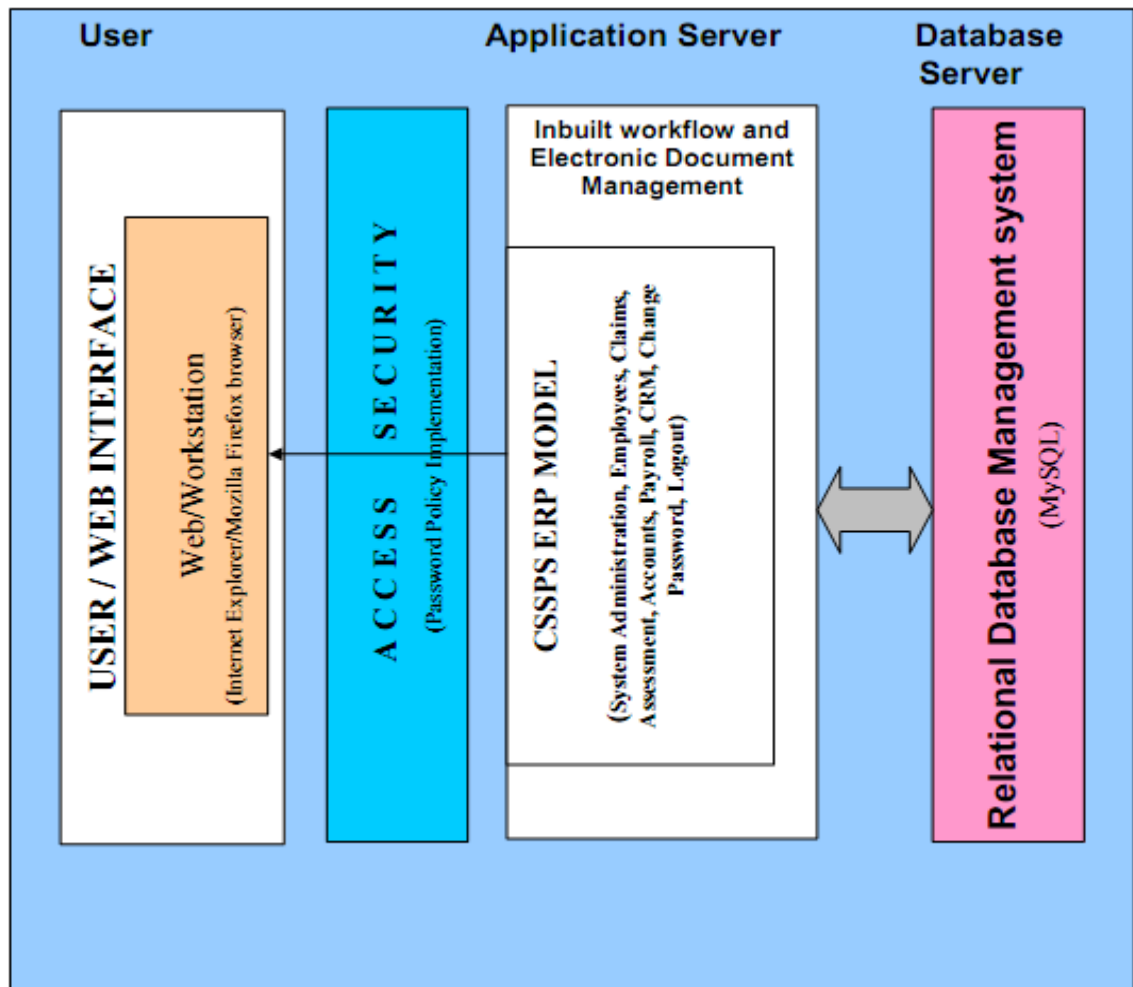
Chapter 5: Figure 7: Conceptual Application Infrastructure

5.7.3 Application Forms

This section presents the application by running the screens that do various functionalities of CSSPS application.

The first screen is accessed by clicking on browser such as Internet Explorer or Mozilla Firefox and typing http://localhost88/cssps on the URL. When this is done the main screen pops up as seen in the next page.
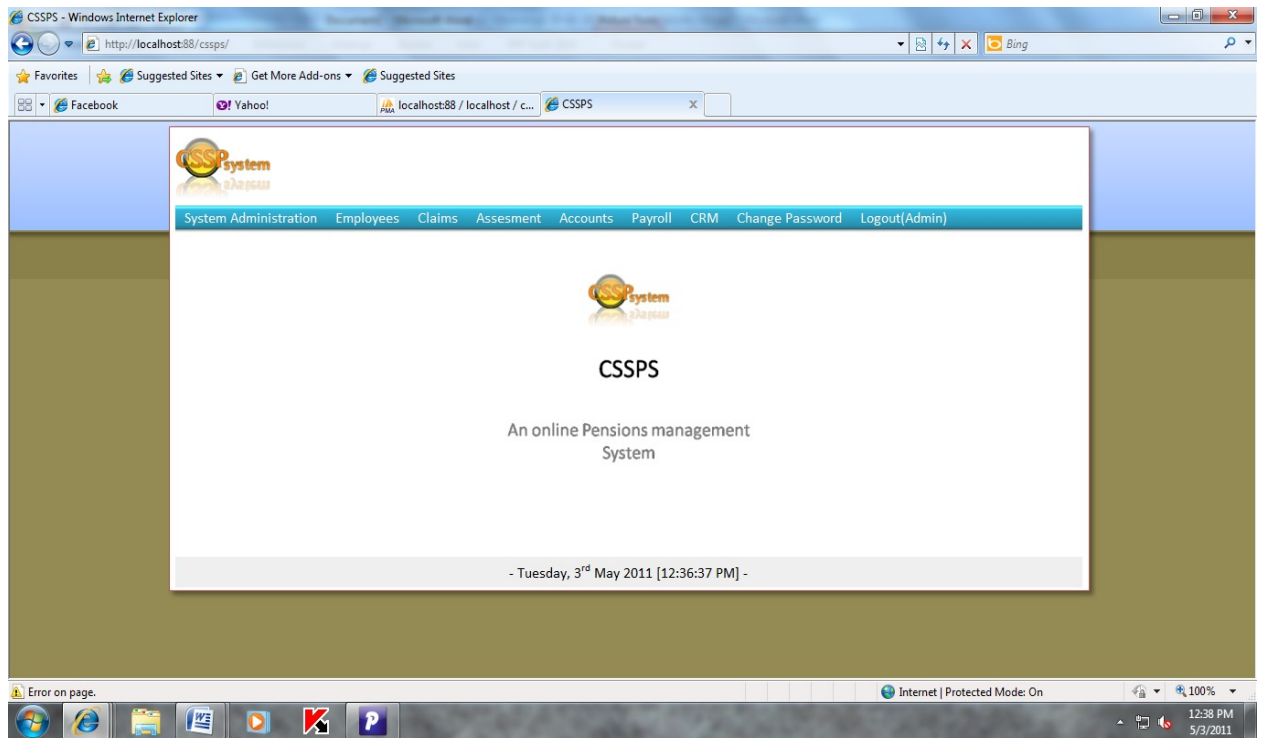
Chapter 5: Figure 8: Main Menu of CSSPS

The figure above shows the main menu of the Civil Service Staff Pensions Scheme (CSSPS) online application. This menu consists of all the functions in the system. A user clicks on the Menu Item to select the function.
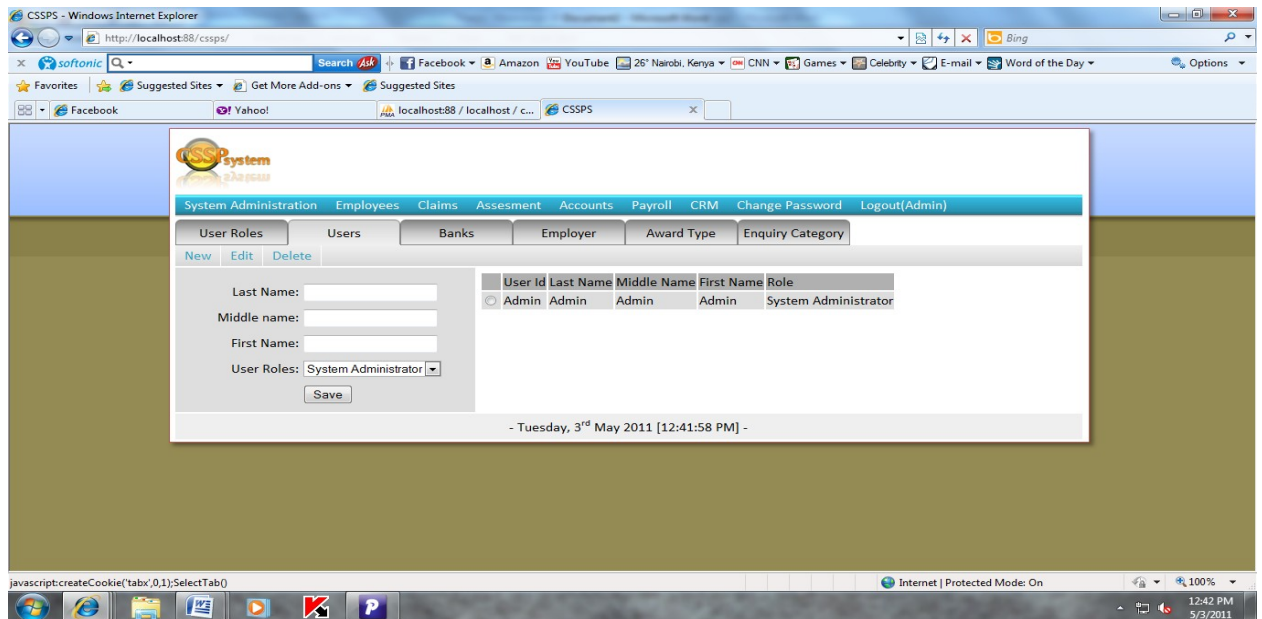
Chapter 5: Figure 9: System Administration Screen

Figure 9 above shows the system administration submenu where user roles, users and setup tables like employer, Award and Enquiry category are captured.

Note: More screens for the CSSPS application are presented in Appendix F.

5.8 Chapter Summary

This chapter covered the system development life cycle starting from system analysis, design and development of the CSSPS. The data used in the section was collected through interviews and the users were therefore consulted throughout the whole process of system development.

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

This chapter presents the summary of study findings, conclusion and recommendations. The conclusion represents a discussion of key findings buttressed by similar findings derived from empirical studies and other relevant sources and literature.

6.1 Summary of Study findings

The purpose of this study was to investigate the use of ICTs for efficient management of Civil Service Staff Pension Scheme in Kenya (CSSPS) with a view to developing an Enterprise Resource Planning (ERP) model (ICT Solution Prototype). What follows below is a summary of the study findings based on the study research questions:-

6.1.1 Extent of ICT integration in the management of CSSPS in Kenya

Regarding extent of integration of ICT in the management of CSSPS in Kenya, the study established that Most of the staff had been trained on basic computer skills and can operate a computer; had access to computers at workplace and/or at home. However, the level of use was found to be low and most people only used computers for non-pension's related functions; and do not serve pensioners through the use of Internet/Web, SMS or mobile phone services.

This observation shows that more training is required to change the attitude and mindset on the use of ICTs in serving pensioners.

6.1.2 Use of ICTs in enhancing service delivery in Pensions Department

Regarding respondents' perceptions on the use of ICTs in enhancing service delivery in Pensions Department:-Majority of the respondents stated that there was no ICT application that offers end-to-end support for pensions processing and payment in the department and therefore the department requires a comprehensive portfolio of technology, application and business process re-engineering in order to embrace effective use of ICTs; and that they would prefer all functions of pensions processing computerized by having a fully integrated enterprise-wide software application. Also

the need to have e-services such as the use of web/internet, SMS and mobile phone access was stated as one of the main factors that are required in order to increase the usage.

This finding shows the need of Pensions Department to have an Enterprise Resource Planning Solution that that will enhance service delivery in the department.

6.1.3 Role of ICTs in enhancing security of Pensions Systems

Regarding the role of ICTs in enhancing security of pensions systems:- Most of the respondents in the sample stated that they did not have an ICT security and data protection policy in the department and therefore they were not even aware of what should be the content of such a policy; accepted that Intrusion detection and prevention was lacking in the existing pensions systems and users were not using passwords to log into computers or applications; and stated that there was no disaster recovery plan or business continuity plan in place for the department.

6.1.4 Challenges Hindering the Effective use of ICTs in CSSPS

The study identified challenges that included:-Poor ICT infrastructure being the major hindrance leading to poor communication within the department and lack of adequate hardware and software to run ICT systems; Financial constraints which ranked second was found to be affecting the procurement of the necessary ICT resources; low us of ICT in serving pensioners although most people were trained in basic ICT skills due to non-availability of an ERP to manage pensions; frequent power disruptions /outages was found to be affecting the running of systems as the department did not have a power backup or disaster recovery procedures to be used in case of power failure; frequent vandalism of ICT equipment which led to theft of computer equipment and/or data affected the operations sometimes leading to loss of pensioners payment; and ICT illiteracy levels among the pensioners and digital divide associated with limitation of use in urban centers since most of the pensioners from rural areas did not have access to computing resources or training.

6.1.5 Suggested Strategies to improve the use of ICTs

On the suggested strategies the study showed that majority of the respondents preferred the department to:- acquire an ERP for CSSPS that would provide end-to-end solution to pensions processing and management; improve ICT infrastructure to

improve information/data sharing and access to ICT resources; enhance staff capacity in terms of ICT knowledge, skills and attitude in order for them to adopt the use of technology; develop and implement ICT security policy to improve the security of ICT resources and/or information; carry out sensitization campaigns and workshops to promote the use of technology in pensions management.

6.1.6 Existing Systems in the Pensions Department

The analysis of the existing systems revealed a number of challenges which included:- existence of multiple legacy systems and operating platforms such as Pensions Systems on Oracle 7.0 and UNIX operating System; Returned Pensions and Revenue Systems on MS Access and Ms Windows' operating System; Payroll System on COBOL in a Mainframe environment. This led to difficulties in sharing data/information and acquiring effective ICT support; multiplicity of disintegrated systems with manual interfaces which created duplication of data and/or inconsistency of data thus compromising integrity, security and efficiency in pensions processing; Pensions processing has complex calculations regarding retirement benefits determination; and takes a lot of time to be done manually often resulting in delay and errors in pensions processing and payment; there existed delays and inefficiency in retrieval of Information to answer pensioners' queries and offer good customer care; and pensioners' files often got misplaced making it completely difficult to respond to pensioners' queries.

These findings shows that Pensions Department did not have an effective system with appropriate security features that can automate the complex calculations and also enhance the security of data/information hence eliminating errors; enhancing data integrity and resulting in faster data retrieval.

6.2 Conclusion

In this study, Enterprise Architecture theory was used as the framework for analysis of functions in Pensions Department. The analysis therefore focused on the what (data), how (function), where (network), who (people), when (time) and why (Motivation/reason) attributes in the Pensions Department. This analysis established the scope, business processes, essential data flows and the technology platform required for the development and implementation of CSSPS.   In addition, theories relating to relational database management system, data warehousing, data mining, business

process re-engineering and ICT security together with modeling tools such as data flow diagrams, entity relationship diagrams were used in analysis and presentation. Indeed the complexity of the Civil Service Staff Pension Scheme required this kind of approach to ensure that all the system requirements were determined.

This study makes important contributions to the use of ICTs in the management of CSSPS in general and Kenya specifically. Firstly, through data analyses, the study analyzed the usage of ICT, service delivery, ICT security as factors hindering the effective use of ICTs in Pensions Department. Analyses of strategies that can be put in place to effectively implement ICTs were also studied. Some of the deductions made included lack of: ICT security policy; business continuity plan and disaster recovery procedures; proper users' accounts management and appropriate infrastructure for accessing information resources.

The study also revealed that although a good percentage of the respondents were trained on the use of basic IT and also had access to computers, the level of usage of computes for service delivery was still very low in the Pensions Department due to other factors such as unavailability of infrastructure and lack of a fully integrated system that comprised all functions. Generally, the results further showed that there was need to adopt the use of ICTs in the management of CSSPS.

In addition, the study confirmed and concludes that there existed weaknesses in CSSPS management in Kenya which could be solved through an enterprise-wide ICT solution. Some of the issues that necessitated this conclusion included:- the current business processes which were found to be manual, repetitive and involved so much paperwork and maintenance of manual registers. The solution to this is adoption of business process re-engineering and development of a new comprehensive ICT solution.

Manual files also need to be digitized for faster retrieval, update of pensioner's records and also response to pensioners' queries. Computerization would also, assist in authentication of claims and reduce loss of documents in the physical files. A fully integrated enterprise-wide ICT solution would also enable sharing of data between systems and other institutions that share data with Pensions Department and help in

alleviating the problem of multiple platforms and existence of islands of systems that have no means of sharing data in the department.

The existing ICT infrastructure was also found to fall short of expectations and hence needs improvement; similarly financial provisions were also found to be inadequate and constrained ICT usage in addition to other factors such as frequent power disruptions, frequent vandalism and the digital divide amongst the urban and rural users.

The study also revealed some strategies preferred by the respondents, notably the acquisition or development of an ERP for CSSPS (ICT solution) to handle all functions of the department which had the highest number of responses. It can also be concluded that for effective and efficient use of an ICT solution, there is need to improve pensions staff capacity in ICTs in order to raise the level of ICT literacy; provide infrastructure for online services such as SMS; Internet and mobile computing; carry out sensitization campaigns to pensioners and the staff on the benefits of using ICTs and adhere to an appropriate ICT policy.

Due to these findings associated with the multiplicity of legacy information systems running in multiple operating platforms, manual execution of some functions, complexity of retirement benefits determination, and the magnitude of data processed in the department the researcher deduced that it was appropriate to have an ICT solution prototype for Civil Service Staff Pensions (CSSPS) management.

The CSSPS ERP Model was conceptualized based on these findings and built to cover all the functional areas in the department and taking into consideration the harmonization of ICT platforms, integration of all the subsystems and the interfaces with other government systems in order to share data/information. The system development was based on Structured Systems Analysis and Design Methodology (SSADM) and used Software development tools as outlined in the previous chapter in construction of the application and creation of database. The tools used were Free and Open Source Software (FOSS) managed by the Open Source Society and therefore did not require licensing and/or vendor lock-in normally associated with Proprietary Commercial Software.

6.3 Recommendations

Based on the study findings, the researcher came up with a number of recommendations as follows:-

6.3.1 Development of ICT infrastructure

On ICT infrastructure, the study established that the existing environment needed improvement and therefore recommended enhancing the level of access of ICT resources through training the staff to improve their ICT capacity; acquisition of additional ICT hardware and software; and building a reliable communication network both local area network (LAN) and wide area network (WAN).

This would enable the department to meet the e-Government objective whose primary delivery model is Government-to-Citizen or Government-to-Customer (G2C), Government-to-Business (G2B), Government-to-Government (G2G) and Government-to-Employees (G2E).

Implementation of ICT infrastructure would enhance use of ICTs such as SMSs, Internet/Web and mobile phone in serving pensioners hence improving delivery of services; and also bridge the digital gap between the rural and urban users in addition to improving interdepartmental/intradepartmental communication and sharing of data/information. A study by UNCTAD, (2002) revealed that although connectivity has significantly improved in many parts of the developing world there were still significant disparities in the level of Internet penetration across the world regions, countries and organizations.

Besides, provision of infrastructure should also include building staff capacity. As noted by Thorpe, (1998), many companies are well aware that their profitability depends on the quality of workforce and so have an interest in training them in the most efficient way. Training staff would provide them with the necessary skills to engage their customers, enhance their productivity and also change their attitude towards the use ICTs in providing pensions services. Training should be broadened to include awareness campaigns that would target the pensioners to improve their views towards the use of technology in provision and/or getting services.

The researcher recommends that the Pensions Department in conjunction with the Directorate of e-Government build an ICT infrastructure (software, hardware,

connectivity and human resources) based on the wider e-government objective of connected government.

6.3.2 Develop an ICT Strategy

As regards the financial constraints the study recommends that the department should develop and implement departmental ICT strategy which should be aligned to the overall strategy of the department and Kenya Vision 2030 which recognizes ICTs as one of the key drivers of economic growth and improvement of service delivery in the Kenyan public service. All the activities in the ICT strategy should be prioritized and budgeted for appropriately.

The ICT division should take a leading role in the development of the strategy in consultation with other divisions within the Pensions Department and stakeholders such as the Directorate of e-Government, Kenya Vision 2030 secretariat the Treasury. Once the strategy is developed, Pensions Department management would use the strategy implement the ICT activities listed therein and endeavor to seek additional funding of ICT activities from various sources including the Treasury using the strategy.

6.3.3 Develop an ICT Security Policy

The researcher recommends the development and implementation of an ICT security policy in Pensions Department since it uses critical systems for pensions processing and payments. The ICT security policy should include:- password policy, disaster recovery policy and general physical access policy regarding access to ICT resources. Further, the researcher recommends the use of high level security features such as data encryption during transit and use of biometric to access systems.   The use of biometric is authentic since it is used to establish identity based on who you are rather than by what you possess for example identification cards or what you remember for example passwords.

Jain A.K. et al., (2004), describes biometric authentication as the automatic identification or identity verification of individuals using behavioral and/or physiological characteristics such as fingerprints, hand geometry, retina, iris, face, or voice recognition.

The study recommend recommends the following to be included in the ICT security:-

- use of a combination password and biometric authentication

- use of data encryption by implementing a public key and private key to access data on transit over the network

- Building and implementation of Network Operations Centre (NOC) to monitor traffic within the network and a Closed Circuit Television (CCTV) to monitor physical and control access

- Building a Disaster Recovery Centre several kilometers away from the production site. The systems in the Disaster Recovery Center and production site should be replicated.

The ICT division in consultation with other divisions within the department and the Directorate of e-Government should develop an ICT security policy to be approved by the Pensions Management before implementation.

6.3.4 Development of an Enterprise wide ICT solution

Based on the above key findings on the existing information systems in the department, the researcher developed a prototype of an Enterprise Resource Planning (ERP) application which is presented in Chapter five: Systems analysis and development. This prototype can be used as a framework to develop a production system for CSSPS in Kenya.

The prototype developed is an end-to-end solution for CSSPS and incorporates all the pensions processing functions, harmonizes the operating and the development platform and also integrates all the modules to enable sharing of data and interfacing with other related systems.

In order for the department to fully embrace the use of ICTs in, the researcher recommends re-engineering of business process through amendments in the existing pensions laws, regulations and processing requirements so as to adopt the use of modern technologies. These changes should be made to recognize and legalize the use of electronic records and/or digitized documents. Pension's management should liaise with the Government Legal advisor and other relevant bodies to ensure that necessary amendments are put in place seamless implementation of an enterprise solution.

Zachman A.J, (1987), state that the complexity of business functions and the need to deliver services effectively and efficiently presents a profound challenge and hence requires the adoption of technological solutions that would meet the customers' needs. The findings reflected on organization chart, business processes, entity relationships, data model, network infrastructure, Technology architecture, System design, trained personnel and an executable system as outlined in the Zackman's Framework.

6.4 Suggestions for Further Study

The research dwelled on the effective use of ICTs for efficient management of Civil Service Staff Pension Scheme in Kenya (CSSPS) with a view to developing an Enterprise Resource Planning (ERP) model (ICT Solution Prototype). Effective use of ICTs for efficient management is a broad based issue and the current study only focused on a very small portion of it. There is need therefore, for further research in the following areas-;

(a) Study on staff and management attitude; their academic and professional back-ground to determine if these variables affect the effective use of ICTs. Different people have different needs and some people are harder to satisfy than others, it would be prudent if management can find out human factors (behavioural, academic and/or professional) that can be implemented in order to satisfy all pensioners by using different means.

(b) Evaluation and selection of ERPs for Public Sector institutions which require a lot of customization due to the existing legacy systems like CSSPS instead of a complete development as conceptualized in this study. In this study the approach was geared towards the development of an application (prototype) through the system development life cycle and the researcher did not consider the option of procuring an existing system based on the findings.

(c) The social security and economic aspects of pensions and the impact of pensions on poverty, health and general economic stability of pensioners. The study rather focused on the scientific aspects of pension's management by investigating how to achieve efficiency in pension's management using ICTs; however, there is need for further research on the social and economic aspects and/or effects of pensions in Kenya.

6.5 Chapter Summary

In this chapter the summary of findings were reported. The results indicated that there were significant weaknesses in the management of CSSPS in Kenya. The results however revealed that the level of ICT usage in the department; efficiency in service delivery and the implementation of security in the management of CSSPS are low and need enhancement. In this chapter, therefore, the researcher discussed the results and summarized recommendations.

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APPENDICES

APPENDIX A

LETTER TO RESPONDENTS

Nyawango Andrew
M.Phi Student
School of Information Sciences
Moi University

ELDORET

Dear Sir/Madam,

RE: RESEARCH ASSISTANCE

I am doing a master of Information Technology at Moi University. In partial fulfillment of the course, I am required to do a research. The subject of my study is "**Effective use of ICTS for Efficient Civil Service Pensions Management in Kenya".** You have been selected to participate in this study by kindly responding/filling the questionnaire. The information provided shall be treated with utmost confidentiality and it is specifically for academic purposes.

Your assistance and cooperation will be highly appreciated.

Thanks in Advance.

Yours truly,

Nyawango Andrew

IS/MPHIL/024/07

APPENDIX B

Data Flow Diagrams

Level 1Context Diagram: A data flow Diagram that shows the main processes within the system. The major inputs and outputs of the processes to and from the data stores and external entities are shown. It identifies the main processes (Claims, Registry etc) describing the main inputs, outputs, main entities and data stores.
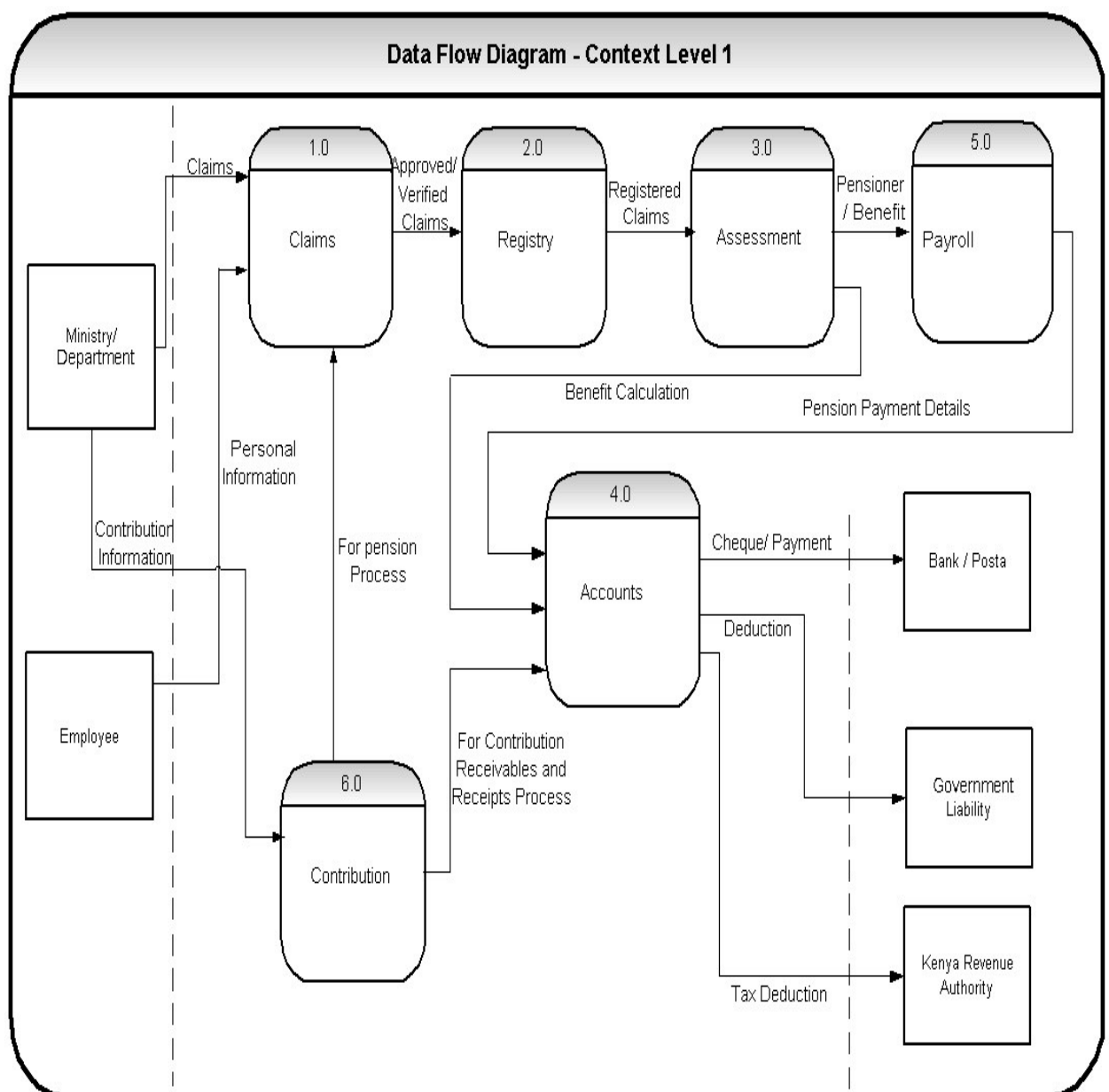
Appendix B: Figure 1: Context Analysis Diagram Level 1

Level 2 Context Diagram: A data flow diagram(s) of a given process (s). For this case, these are the process module Data Flow Diagrams i.e. Claims module, Registry Module, Assessment Module etc.
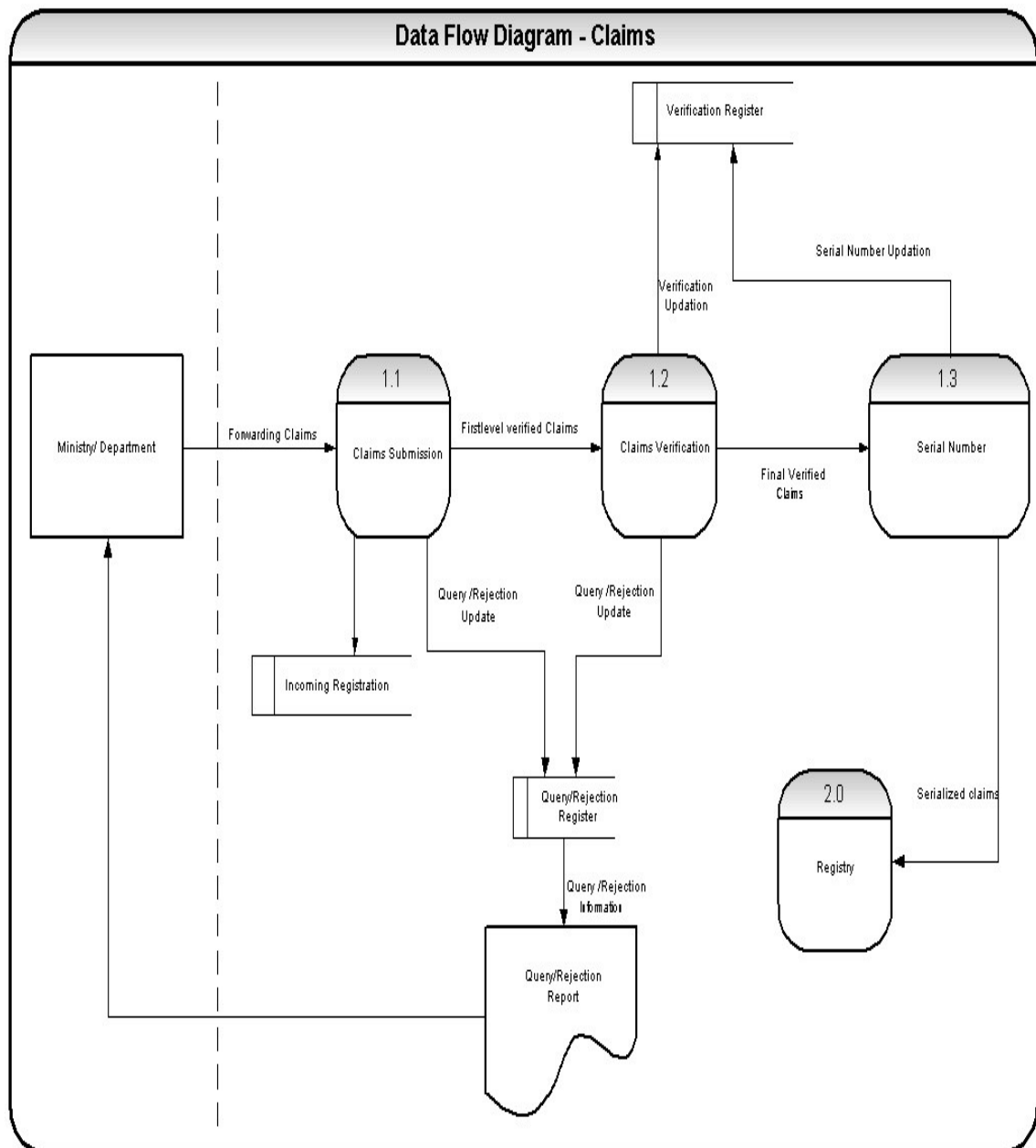
Appendix B: Figure 2: Claims Data Flow Diagram
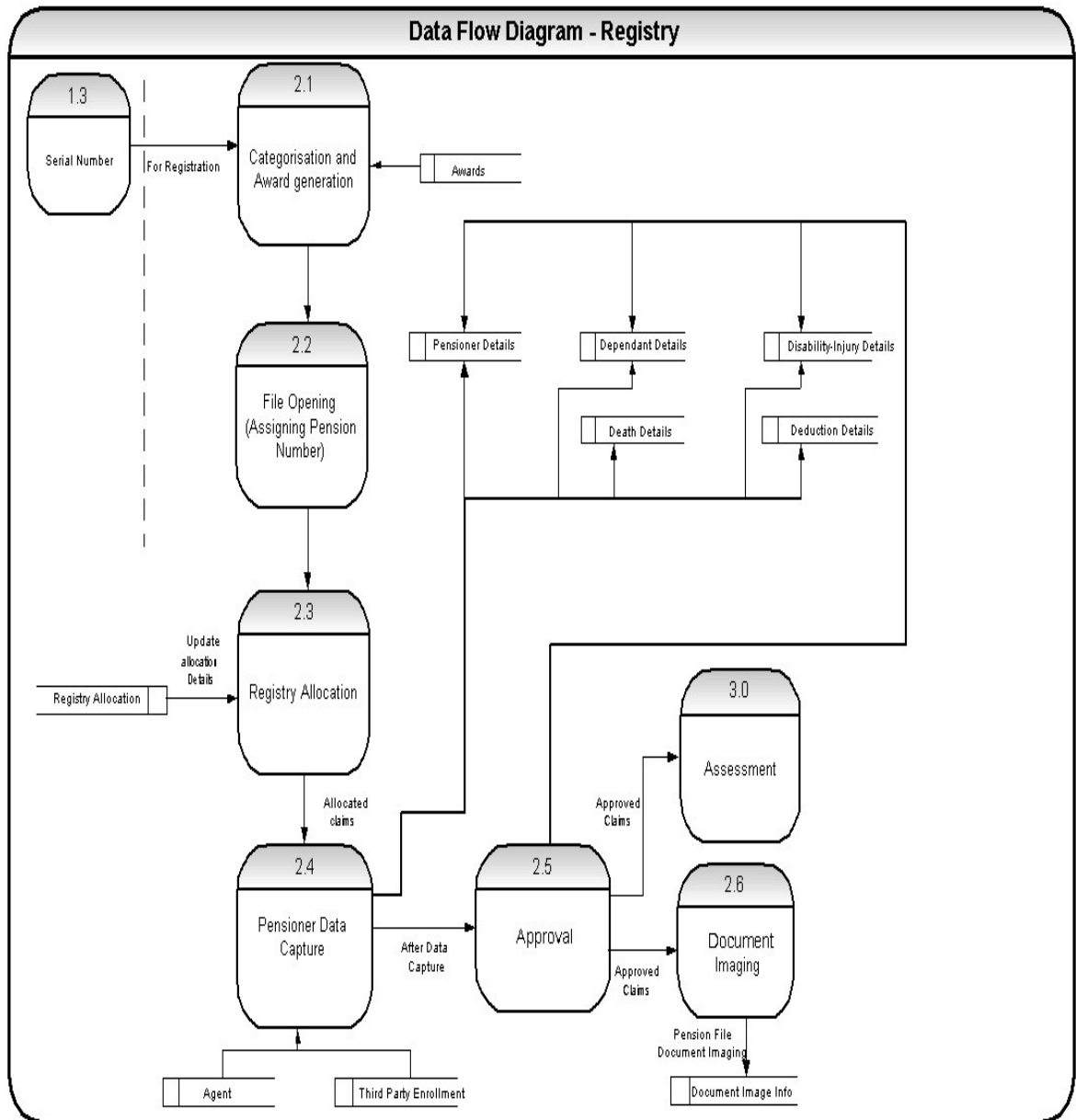
Appendix B: Figure 3: Registry Data Flow Diagram
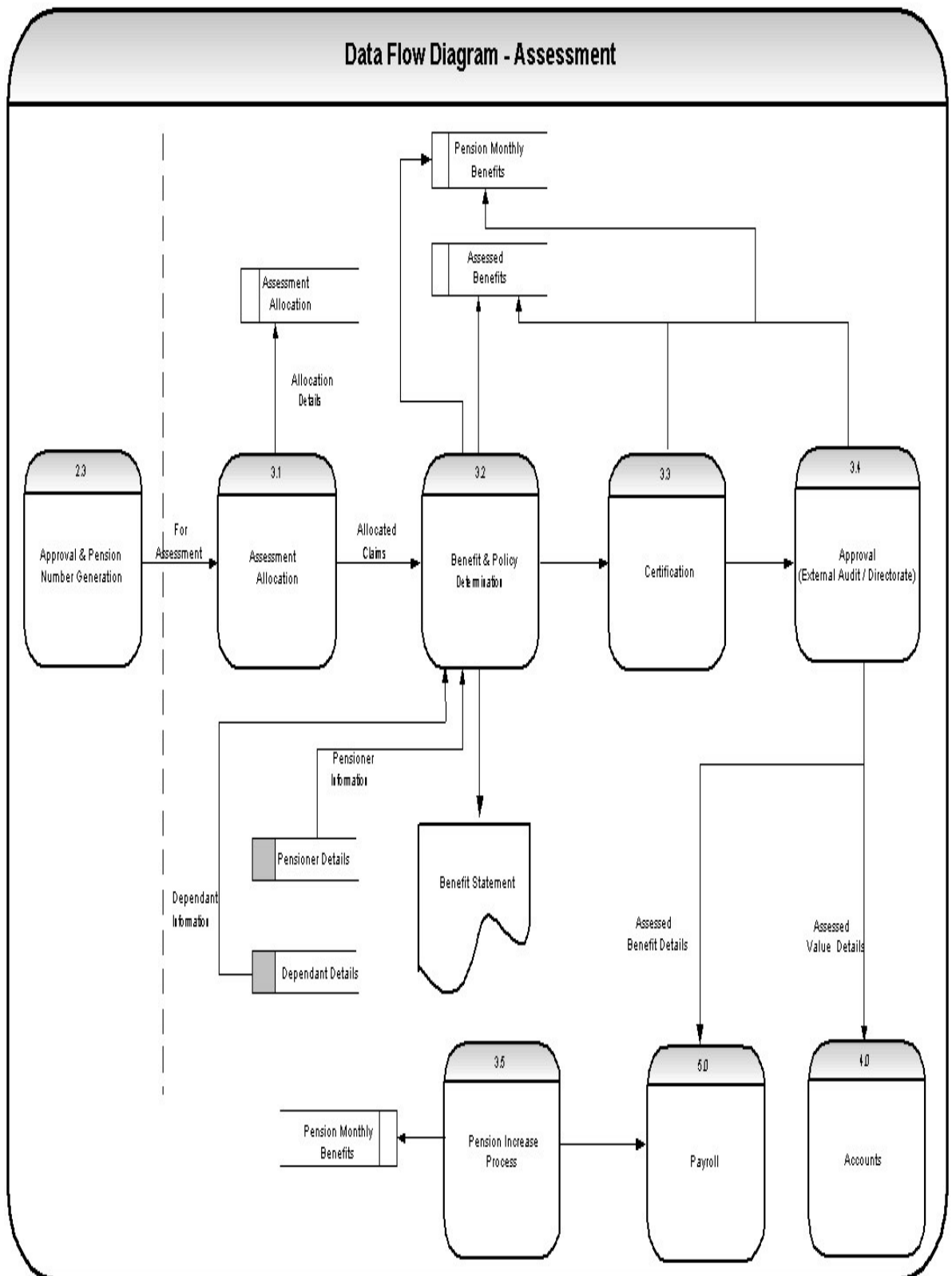
Appendix B: Figure 4: Assessment Data Flow Diagram
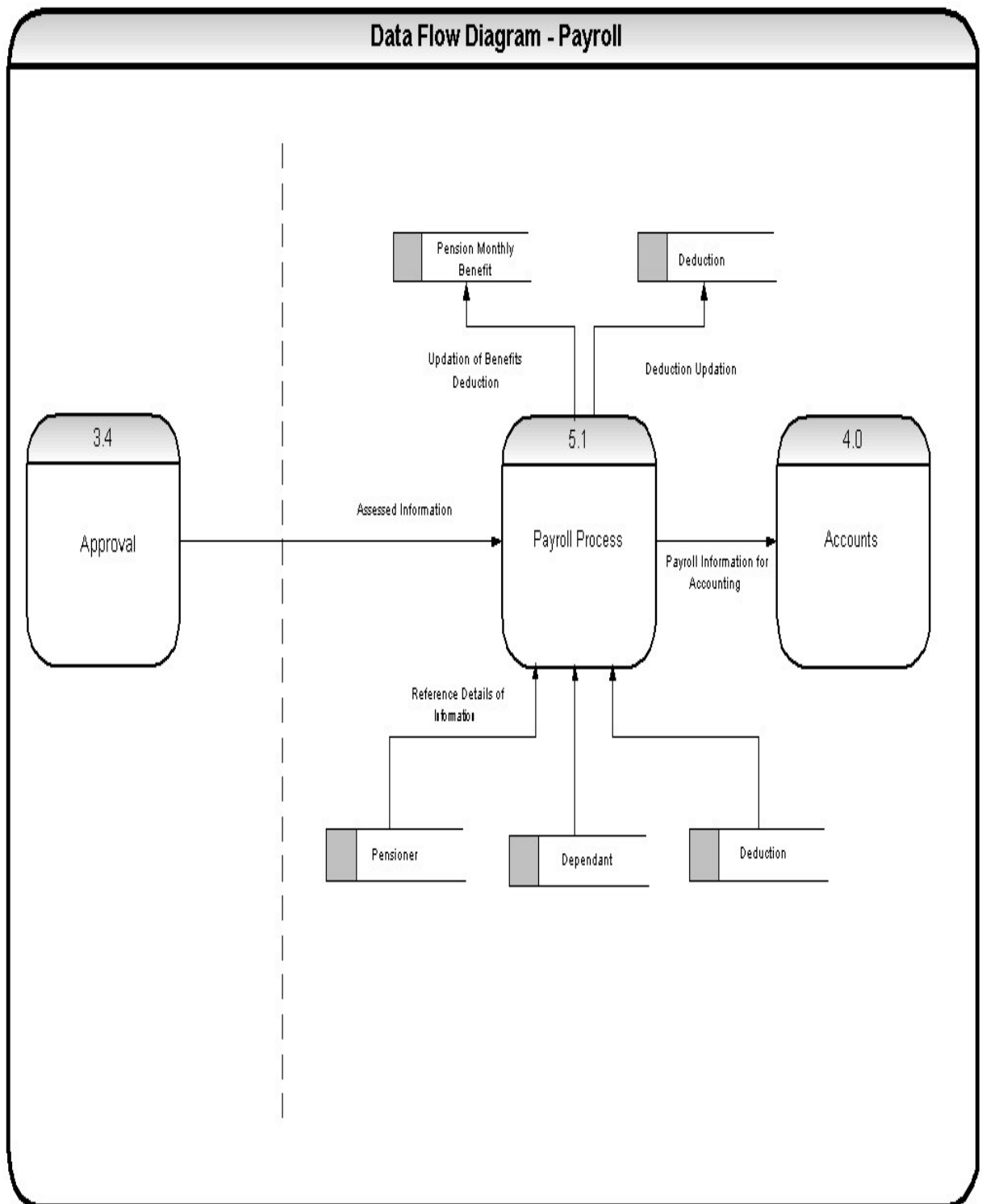
Appendix B: Figure 5: Payroll Data Flow Diagram
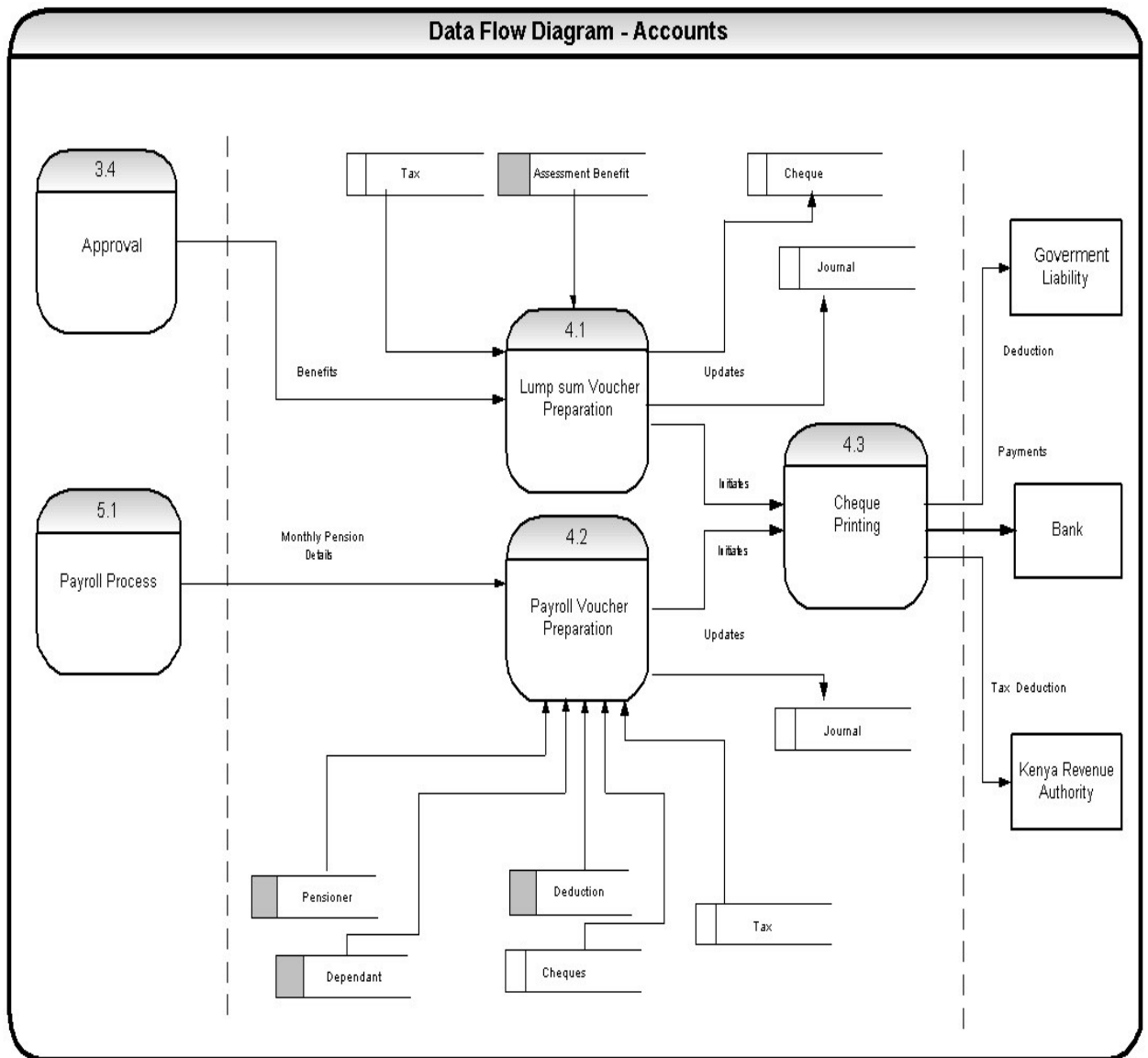
Appendix B: Figure 2: Accounts Data Flow Diagram

APPENDIX C

Database Tables

EMPLOYEE

Field	Type	Null	Default	Comments
Personal_number	varchar(10)	No		
Surname	varchar(20)	Yes	*NULL*	
Firstname	varchar(20)	Yes	*NULL*	
Middlename	varchar(20)	Yes	*NULL*	
Ministry_code	varchar(3)	Yes	*NULL*	
Birth_date	date	Yes	*NULL*	
Employment_date	date	Yes	*NULL*	
Retirement_date	date	Yes	*NULL*	
Gender	tinyint(1)	Yes	*NULL*	
Marital_status	varchar(10)	Yes	*NULL*	
Idno	bigint(20)	Yes	*NULL*	
Death_status	tinyint(1)	Yes	*NULL*	
Death_date	date	Yes	*NULL*	
Death_cert_no	varchar(20)	Yes	*NULL*	
Pin	varchar(12)	Yes	*NULL*	
Tos	varchar(20)	Yes	*NULL*	
Last_sal	float	Yes	*NULL*	

Indexes:

Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	Personal_no	0	A		

CLAIM

Field	Type	Null	Default	Comments
Claim_no	int(11)	No		
Personal_number	varchar(10)	Yes	*NULL*	
Date_received	timestamp	No	CURRENT_TIMESTAMP	
Claim_status	varchar(11)	Yes	*NULL*	
Remarks	varchar(255)	Yes	*NULL*	

Indexes:

Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	Claim_no	0	A		

PENSIONER_BANK

Field	Type	Null	Default	Comments
Pensioner_no	varchar(15)	No		
Bank_code	varchar(5)	No		
Branch_code	varchar(5)	No		
Account_number	varchar(16)	No		
Effective_date	date	Yes	*NULL*	
End_date	date	Yes	*NULL*	
Active	tinyint(1)	Yes	*NULL*	

Indexes:

Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	Pensioner_no	0	A		
				Bank_code	0	A		
				Account_no	0	A		
bank_code	BTREE	No	No	Bank_code	0	A		
				Branch_code	0	A		

PENSIONER

Field	Type	Null	Default	Comments
Pensioner_no	varchar(15)	No		
Personal_number	varchar(10)	Yes	*NULL*	
Surname	varchar(20)	Yes	*NULL*	
Firstname	varchar(20)	Yes	*NULL*	
Middlename	varchar(20)	Yes	*NULL*	
Ministry_code	varchar(3)	Yes	*NULL*	
Birth_date	date	Yes	*NULL*	
Employment_date	date	Yes	*NULL*	
Retirement_date	date	Yes	*NULL*	
Enrolled_date	timestamp	No	CURRENT_TIMESTAMP	
Gender	tinyint(1)	Yes	*NULL*	
Marital_status	varchar(10)	Yes	*NULL*	
Idno	bigint(20)	Yes	*NULL*	
Death_status	tinyint(1)	Yes	*NULL*	
Death_date	date	Yes	*NULL*	
Death_cert_no	varchar(20)	Yes	*NULL*	
Pin	varchar(12)	Yes	*NULL*	
Tos	varchar(20)	Yes	*NULL*	
Last_sal	float	Yes	*NULL*	
Award_type	varchar(3)	Yes	*NULL*	
Status	varchar(15)	No	Registered	

Indexes:

Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	Pensioner_no	0	A		

ASSESMENT

Field	Type	Null	Default	Comments
Pensioner_no	varchar(15)	No		
Assesment_date	Date	No	CURRENT_TIMESTAMP	
Remarks	varchar(255)	Yes	*NULL*	

Indexes:

Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	Pensioner_no	0	A		
				Assesment_date	0	A		

AWARD

Field	Type	Null	Default	Comments
Type	varchar(3)	No		
Descr	varchar(20)	Yes	*NULL*	

Indexes:

Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	Type	0	A		

BANK

Field	Type	Null	Default	Comments
Bank_id	int(11)	No		
Bank_code	varchar(5)	No		
Bank_name	varchar(50)	No		
Branch_code	varchar(8)	No		
Branch_name	varchar(50)	Yes	*NULL*	

Indexes:

Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	Bank_code	0	A		
				Branch_code	0	A		
bank_id	BTREE	Yes	No	Bank_id	0	A		

PAYROLL

Field	Type	Null	Default	Comments
Pensioner_no	varchar(15)	No		
Payroll_date	varchar(9)	No		
Monthly_pension	float	No	0	
Arrears	float	No	0	
Tax	float	No	0.15	

Indexes:

Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	Pensioner_no	0	A		
				Payroll_date	0	A		

ENQUIRIES_LOG

Field	Type	Null	Default	Comments
Pensioner_no	varchar(15)	No		
Enquiry_time	timestamp	No	CURRENT_TIMESTAMP	
Category	int(11)	Yes	*NULL*	
Details	text	Yes	*NULL*	
Status	varchar(20)	No	new	

Indexes:

Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	Pensioner_no	0	A		
				Enquiry_time	0	A		

ENQUIRY_CATEGORY

Field	Type	Null	Default	Comments
Code	int(11)	No		
Descr	varchar(20)	Yes	*NULL*	

Indexes:

Keyname	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	Code	0	A		

ROLES

Field	Type	Null	Default	Comments
Role_id	int(11)	No		
Descr	varchar(100)	Yes	*NULL*	
Admin	tinyint(1)	Yes	*NULL*	
Hr	tinyint(1)	Yes	*NULL*	
Claim_new	tinyint(1)	Yes	*NULL*	
Claim_edit	tinyint(1)	Yes	*NULL*	
Claim_delete	tinyint(1)	Yes	*NULL*	
Claim_accept_reject	tinyint(1)	Yes	*NULL*	
Claim_register	tinyint(1)	Yes	*NULL*	
Assesment	tinyint(1)	Yes	*NULL*	
Accounts	tinyint(1)	Yes	*NULL*	
Payroll	tinyint(1)	Yes	*NULL*	
Crm	tinyint(1)	Yes	*NULL*	

Indexes:

Key name	Type	Unique	Packed	Field	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	Role_id	2	A		

APPENDIX D

Tables Creation codes

The following is the code for creating the database tables:-

```
-- phpMyAdmin SQL Dump
-- version 3.3.9
-- http://www.phpmyadmin.net
-- Host: localhost
-- Generation Time: Mar 31, 2011 at 04:06 AM
-- Server version: 5.0.91
-- PHP Version: 5.2.9
SET SQL_MODE="NO_AUTO_VALUE_ON_ZERO";
/*! SET
@OLD_CHARACTER_SET_CLIENT=@@CHARACTER_SET_CLIENT /;
/*!1 SET
@OLD_CHARACTER_SET_RESULTS=@@CHARACTER_SET_RESULTS */;
/*!40101 SET
@OLD_COLLATION_CONNECTION=@@COLLATION_CONNECTION */;
/*!40101 SET NAMES utf8 */;
--
-- Database: `cssps`
-- --------------------------------------------------
---
-- Table structure for table `assesment`
CREATE TABLE IF NOT EXISTS `assesment`(
  `pensioner_no` varchar(15) NOT NULL default '',
  `assesment_date`
timestamp NOT NULL default CURRENT_TIMESTAMP on update CURRENT_TIMESTAMP,
PRIMARY KEY  (`pensioner_no`,`assesment_date`)
) ENGINE=MyISAM DEFAULT CHARSET=latin1;
-- -----------------------------------------------------
```

```sql
---
-- Table structure for table `award`
CREATE TABLE IF NOT EXISTS `award` (
  `type` varchar(3) NOT NULL,
  `descr` varchar(20) default NULL,
PRIMARY KEY  (`type`)
) ENGINE=MyISAM DEFAULT CHARSET=latin1;
-- --------------------------------------------------------
-- Table structure for table `bank`
CREATE TABLE IF NOT EXISTS `bank` (
  `bank_id` int(11) NOT NULL auto_increment,
  `bank_code` varchar(5) NOT NULL,
  `branch_code` varchar(5) NOT NULL,
  `bank_name` varchar(50) default NULL,
PRIMARY KEY  (`bank_code`,`branch_code`),
UNIQUE KEY `bank_id` (`bank_id`)
) ENGINE=MyISAM DEFAULT CHARSET=latin1 AUTO_INCREMENT=1 ;
-- --------------------------------------------------------
-- Table structure for table `claim`
CREATE TABLE IF NOT EXISTS `claim` (
  `claim_no` int(11) NOT NULL auto_increment,
  `personal_number` varchar(10) default NULL,
  `date_received`
timestamp NOT NULL default CURRENT_TIMESTAMP on update CURRENT_TIMESTAMP,
  `claim_status` varchar(8) default NULL,
  `remarks` varchar(255) default NULL,
PRIMARY KEY  (`claim_no`)
) ENGINE=MyISAM DEFAULT CHARSET=latin1 AUTO_INCREMENT=1 ;
-- --------------------------------------------------------
--
-- Table structure for table `enquiries_log`
CREATE TABLE IF NOT EXISTS `enquiries_log` (
  `pensioner_no` varchar(15) NOT NULL,
```

```sql
  `enquiry_time`
timestamp NOT NULL default CURRENT_TIMESTAMP on update CURRENT_TIMESTAMP,
  `category` int(11) default NULL,
  `details` text,
PRIMARY KEY  (`pensioner_no`,`enquiry_time`)
) ENGINE=MyISAM DEFAULT CHARSET=latin1;

-- --------------------------------------------------------

--
-- Table structure for table `enquiry_category`
CREATE TABLE IF NOT EXISTS `enquiry_category` (
  `code` int(11) NOT NULL auto_increment,
  `descr` varchar(20) default NULL,
PRIMARY KEY  (`code`)
) ENGINE=MyISAM DEFAULT CHARSET=latin1 AUTO_INCREMENT=1 ;

-- --------------------------------------------------------

--
-- Table structure for table `payroll`
CREATE TABLE IF NOT EXISTS `payroll` (
  `pensioner_no` varchar(15) NOT NULL,
  `payroll_date` varchar(9) NOT NULL,
  `mnthly_pension` float default NULL,
  `arrears` float default NULL,
  `tax` float default NULL,
PRIMARY KEY  (`pensioner_no`,`payroll_date`)
) ENGINE=MyISAM DEFAULT CHARSET=latin1;

-- --------------------------------------------------------

--
-- Table structure for table `pensioner`
CREATE TABLE IF NOT EXISTS `pensioner` (
  `pensioner_no` varchar(15) NOT NULL,
  `personal_number` varchar(10) default NULL,
  `award_type` varchar(3) default NULL,
PRIMARY KEY  (`pensioner_no`)
```

```sql
) ENGINE=MyISAM DEFAULT CHARSET=latin1;
-- --------------------------------------------------------
--
-- Table structure for table `pensioner_bank`
CREATE TABLE IF NOT EXISTS `pensioner_bank` (
  `pensioner_no` varchar(15) NOT NULL,
  `bank_code` varchar(5) NOT NULL,
  `account_number` varchar(16) NOT NULL default '',
  `effective_date` date default NULL,
  `end_date` date default NULL,
  `active` tinyint(1) default NULL,
PRIMARY KEY (`pensioner_no`,`bank_code`,`account_number`)
) ENGINE=MyISAM DEFAULT CHARSET=latin1;
-- --------------------------------------------------------
--
-- Table structure for table `roles`
--
CREATE TABLE IF NOT EXISTS `roles` (
  `role_id` int(11) NOT NULL auto_increment,
  `descr` varchar(100) default NULL,
  `claims` tinyint(1) default NULL,
  `accounts` tinyint(1) default NULL,
  `payroll` tinyint(1) default NULL,
  `customer` tinyint(1) default NULL,
  `admin` tinyint(1) default NULL,
PRIMARY KEY (`role_id`)
) ENGINE=MyISAM  DEFAULT CHARSET=latin1 AUTO_INCREMENT=2 ;
--
--
INSERT INTO `roles` (`role_id`, `descr`, `claims`, `accounts`, `payroll`, `customer`, `admin`) VALUES
(1,'System Administrator', 1, 1, 1, 1, 1);
-- --------------------------------------------------
---
```

-- Table structure for table `user`

CREATE TABLE IF NOT EXISTS `user` (

  `user_id` varchar(10) NOT NULL,

  `lastname` varchar(20) NOT NULL,

  `middlename` varchar(20) NOT NULL,

  `firstname` varchar(20) NOT NULL,

  `password` text NOT NULL,

  `role` int(11) default NULL,

PRIMARY KEY (`user_id`)

) ENGINE=MyISAM DEFAULT CHARSET=latin1;

APPENDIX E

CSSPS Forms/Screens

Appendix E: Figure 1: Employee Enrolment Screen

Appendix E: Figure 1 shows the screens where Employee details are uploaded are captured for enrolment of claims.

Appendix E: Figure 2: Claims Enrolment Screen

Appendix E: Figure 2 shows the claims enrolment and approval screen. Once enrolled the claim is then registered through the screen shown in figure 16 below.

Appendix E: Figure 3: Pensioner Registration Screen

The screen shows where the pensioner details are captured

Appendix E: Figure 4: Assessment Screen
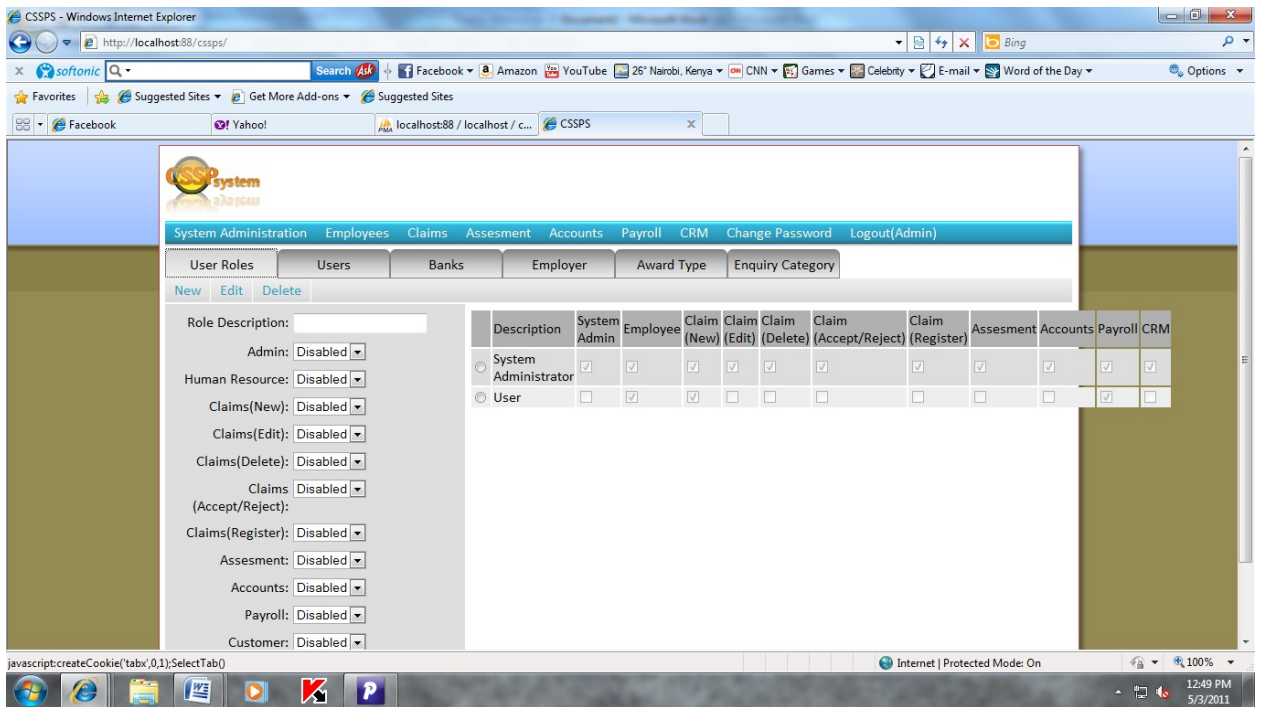
Appendix E: Figure 5: Users Roles Assignment Screen
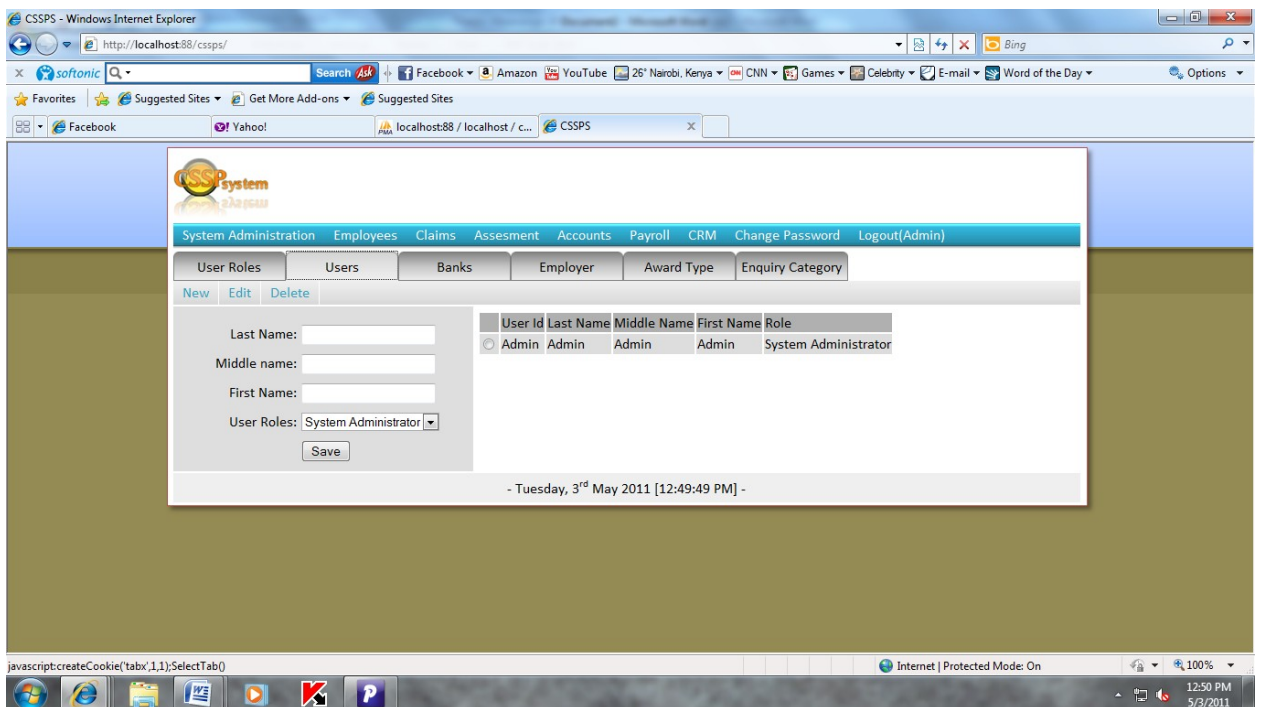
Appendix E: Figure 6: Users Creation Screen
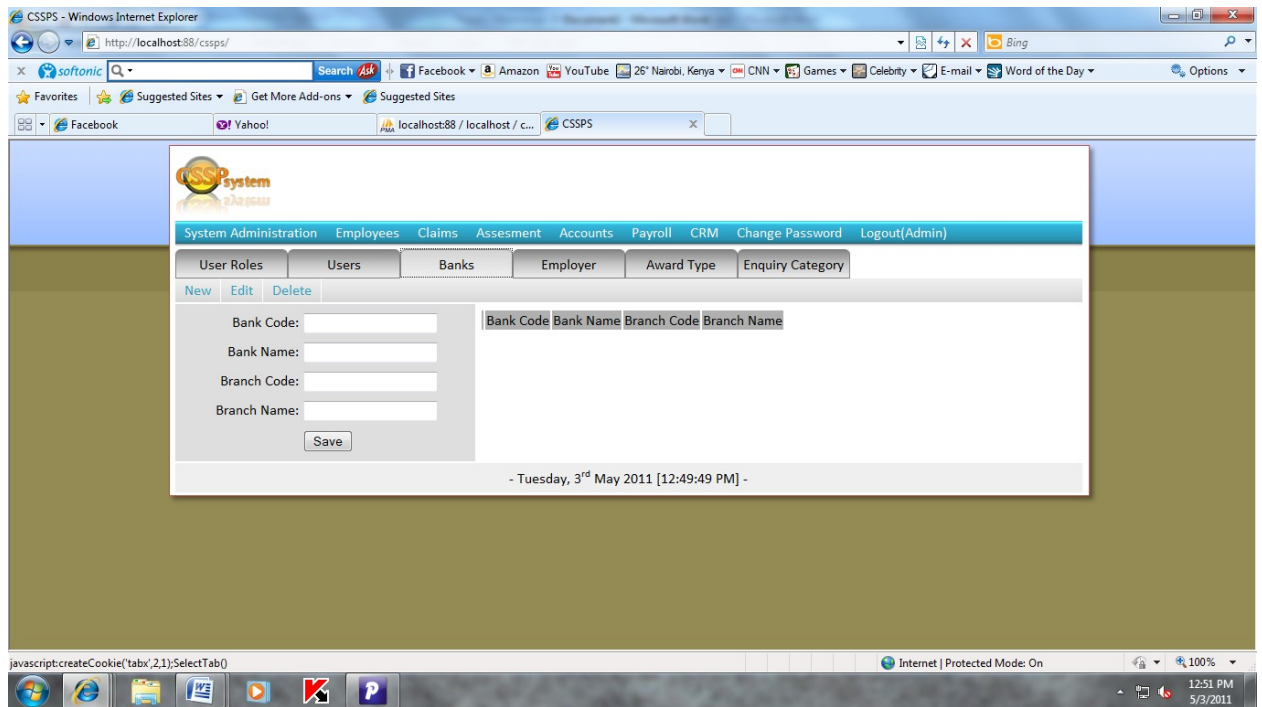
Appendix E: Figure 7: Banks Set up Screen
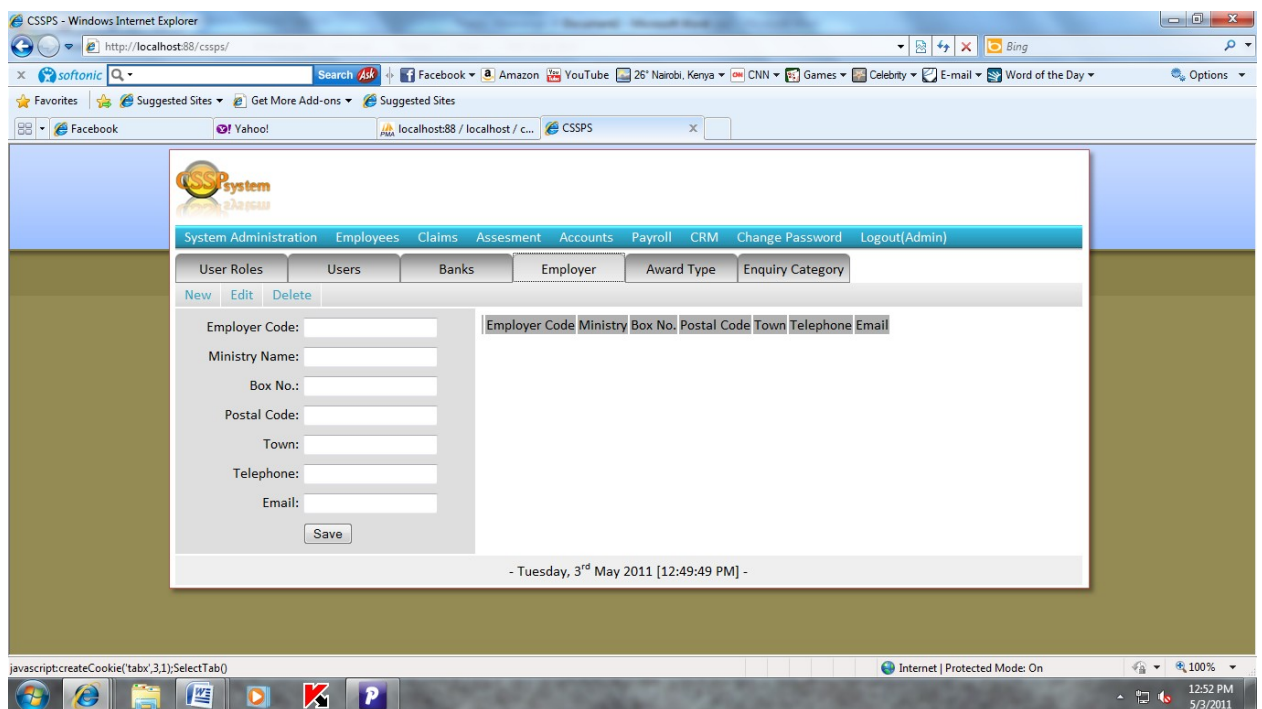
Appendix E: Figure 8: Employer Set up screen

Set up screen for employer
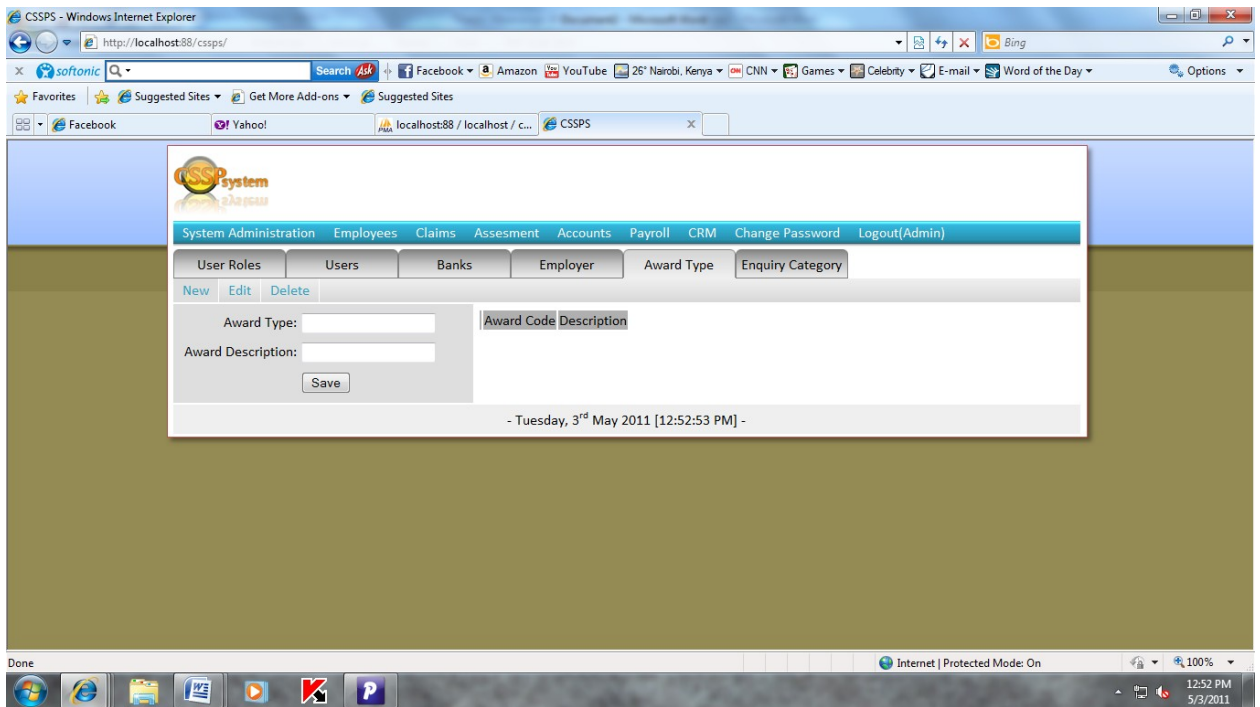
Appendix E: Figure 9: Award set up screen
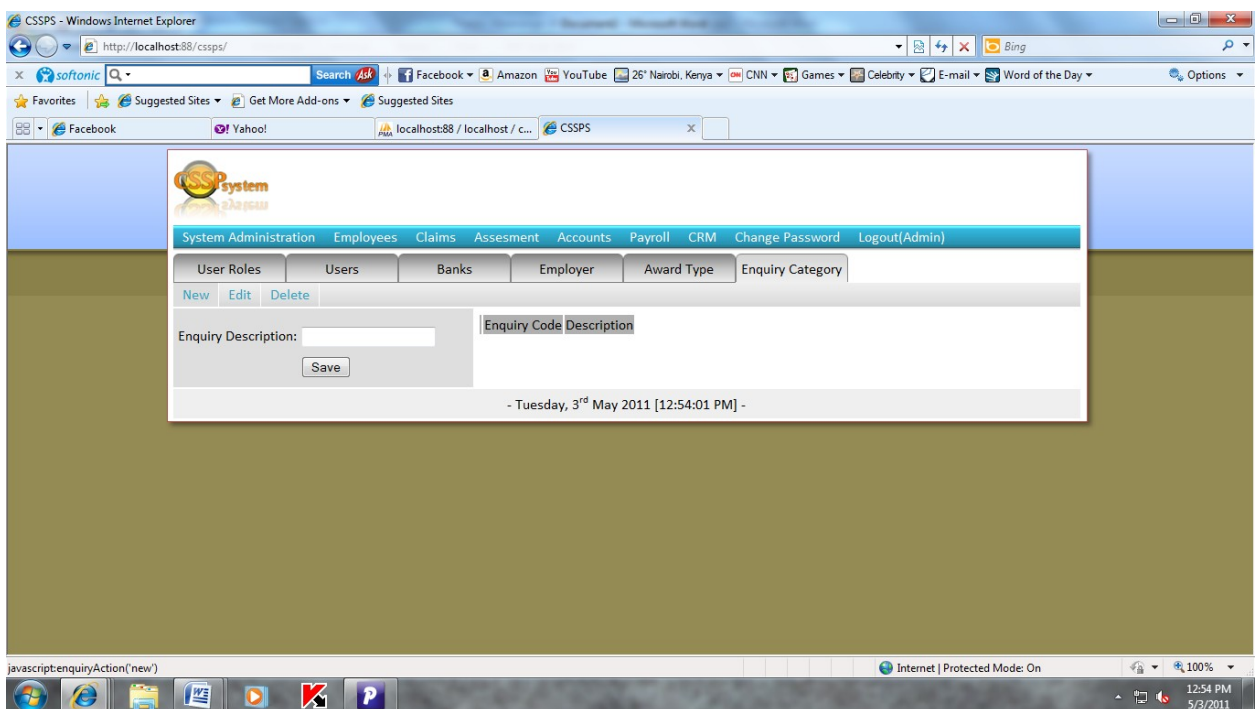
Appendix E: Figure 10: Enquiry Category set up screen

APPENDIX F

QUESTIONNAIRE FOR PENSIONS MANAGEMENT STAFF

Topic: "Effective use of ICTS for Efficient Civil Service Pensions Management in Kenya"

Purpose of Research: Partial Fulfillment for the Award of Master Degree in Information Technology

Matters to Note

iii. The information given on this questionnaire will be held in strict confidence and will be used only for the purpose of study

iv. If any of the questions may not be appropriate to your circumstances, you are under no obligation to answer.

Section A: respondents background information

1. Gender of Respondent

Male ☐   Female ☐

2. What is your age bracket?

20 – 30 years ( )   31 – 40 years ( )   41 – 50 years ( )

Over 50 years ( )

3. What is your highest level of education obtained?

Nil   ( )

Primary   ( )

Secondary   ( )

Tertiary   ( )

University   ( )

4. DESIGNATION--

Section B: Research questionnaire

This Questionnaire is designed to determine the level of usage ICT, efficiency and effectiveness of ICT and Security of ICT use in Pensions processing.

Part I: ICT Usage

1. You have been trained on basic computer skills and can operate a computer?

a. Strongly agree   ☐

b. Agree ☐

c. Neutral

d. Disagree ☐

☐

e. Strongly disagree ☐

2. You have access to a computer at your work place or at home?

a) Strongly agree ☐

b) Agree ☐

c) Neutral ☐

d) Disagree ☐

e) Strongly disagree ☐

3. How frequently do you use a computer in your office work?

a) Everyday ☐

b) Once a week ☐

c) More than amonth ☐

d) Not Sure ☐

e) Not at all ☐

4. What do you use computers for in the office?

a) Ms Office Applications & Pensions Systems ☐

b) Internet / Office communication/email ☐

c) Pensions Systems only ☐

d) Others (Name_____) ☐

e) Not all ☐

5. You offer services to the Pensioners through Internet/Web, SMS or mobile phone?

a. Strongly agree ☐

b. Agree ☐

c. Neutral ☐

d. Disagree ☐

e. Strongly disagree ☐

Part II: Service Delivery

1. You have an application that end-to-end support for Pensions processing and Payment?

a) Strongly agree ☐

b) Agree

c) Neutral

d) Disagree

e) Strongly disagree

2. Pensions Department requires a comprehensive portfolio of technology, application and Business Process Re-engineering

   a) Strongly agree

   b) Agree

   c) Neutral

   d) Disagree

   e) Strongly disagree

3. A fully integrated enterprise wide software application is needed for efficient and effective service delivery

   a) Strongly agree

   b) Agree

   c) Neutral

   d) Disagree

   e) Strongly disagree

4. E-Services such as web/Internet, sms and mobile access to pensions services will improves service delivery to pensioners

   a. Strongly agree

   b. Agree

   c. Neutral

   d. Disagree

   e. Strongly disagree

5. What functions of pensions processing would you like computerized?

   a) All

   b) Most,

   c) Few

   d) Not Sure

   e) None

6. What suggestions would you give to enhance efficiency and effectiveness in the usage of ICT in Pensions Processing?

Part III: Security

1. You have an ICT security policy and data protection policy in Pensions Department and the staffs are familiar with contents?

    a) Strongly agree

    b) Agree

    c) Neutral

    d) Disagree

    e) Strongly disagree

2. Intrusion detection and prevention is lacking in the pensions processing and sharing of data?

    a) Strongly agree

    b) Agree

    c) Neutral

    d) Disagree

    e) Strongly disagree

3. You have a business continuity plan in case of a disaster?

    a) Strongly agree

    b) Agree

    c) Neutral

    d) Disagree

    e) Strongly disagree

4. You use login password when logging in to use computer or any other application in Pensions Department?

    a. Strongly agree

    b. Agree

    c. Neutral

    d. Disagree

    e. Strongly disagree

5. What other security measures would like to be put in place to ensure security of data in pensions processing?

Part IV: Challenges hindering the effective use of ICTs in CSSPS

Note: Please mark only one factor amongst the listed factors that you feel mostly hinder the effective use of ICTs.

What Challenges are hindering effective use of ICTs in CSSPS?

      ICT literacy   ( )

      Limited to Urban Centers ( )

      Poor ICT infrastructure   ( )

      Financial Constraints   ( )

      Frequent Vandalism   ( )

      Frequent power disruptions ( )

Part V: Suggested Strategies

Note: Please mark only one strategy amongst the listed strategies that you feel can be put in place to enhance the use of ICTs in Pensions Department.

Suggest Strategies that can enhance use of ICTs in Pensions Department

      Adherence to us of ICT policy ( )

      Enhance capacity building   ( )

      Improve ICT infrastructure   ( )

      Carry out sensitization campaign ( )

      Acquire CSSPS ERP (ICT Solution) ( )

APPENDIX G

INTERVIEW QUESTIONS FOR THE DIRECTORATE STAFF (MANAGEMENT)

Topic: "Effective use of ICTS for Efficient Civil Service Pensions Management in Kenya"

Purpose of Research: Partial Fulfillment for the Award of Master Degree in Information Technology

Matters to Note

v. The information given on this questionnaire will be held in strict confidence and will be used only for the purpose of study

vi. If any of the questions may not be appropriate to your circumstances, you are under no obligation to answer.

Section A: respondents background information

1. **Gender of Respondent**

Male ☐   Female ☐

2. What is your age bracket?

20 – 30 years ( )   31 – 40 years ( )   41 – 50 years ( )

Over 50 years ( )

3. What is your highest level of education obtained?

Nil	( )
Primary	( )
Secondary	( )
Tertiary	( )
University	( )

4. DESIGNATION--

Section B: Research questionnaire

1. WHAT IS THE MANDATE OF YOUR ORGANIZATION?

   ----

2. WHAT ARE THE DIVISIONS IN THE DEPARTMENT AND HOW IS THE DEPARTMENT STRUCTURED?

----

3. DOES THIS ORGANIZATION STRUCTURE MEET YOUR BUSINESS
   GOALS? IF NOT, EXPLAIN

----

4. WHAT CHALLENGES DOES THE DEPARTMENT FACE IN
   FULFILLING ITS MANDATE?

----

5. WHAT STRATEGIES HAVE YOU PUT IN PLACE TO ALIGN ICT TO
   THE ORGANIZATION'S BUSINESS MANDATE?

----

6. DOES YOUR ORGANIZATION SHARE INFORMATION WITH OTHER
   BODIES? IF YES, WHICH ONES?

INTERVIEW QUESTIONS FOR RETIREMENT BENEFITS DETERMINATION STAFF

Topic: "Effective use of ICTS for Efficient Civil Service Pensions Management in Kenya"

Purpose of Research: Partial Fulfillment for the Award of Master Degree in Information Technology

Matters to Note

vii. The information given on this questionnaire will be held in strict confidence and will be used only for the purpose of study

viii. If any of the questions may not be appropriate to your circumstances, you are under no obligation to answer.

Section A: respondents background information

1. **Gender of Respondent**

Male ☐   Female ☐

2. What is your age bracket?

20 – 30 years ( )   31 – 40 years ( )   41 – 50 years ( )

Over 50 years ( )

3. What is your highest level of education obtained?

Nil	( )
Primary	( )
Secondary	( )
Tertiary	( )
University	( )

4. DESIGNATION---

Section B: Research questionnaire

1. WHAT ACTS GOVERN PENSIONS PAYMENT?

 ----

2. WHAT CATEGORY OF PEOPLE QUALIFIES TO BE MEMBERS OF THE SCHEME?

----

3. HOW DOES THE DEPARTMENT RECEIVE PENSIONCLAIMS FROM

    MEMBERS?

    ----

4. NARRATE HOW A PESIONS CLAIM IS PROCESSED

    ----

5. WHAT ARE THE RULES AND PROCEDURES FOLLOWED IN

    PROCESSING PENSIONS CLAIMS?

    ----

6. DESCRIBE THE APPROVAL LEVELS YOU HAVE IN PENSIONS

    PROCCESSING?

    ----

7. WHAT PROBLEMS DO YOU FACE IN PENSIONS PROCESSING?

    ----

8. WHAT MEASURES DO YOU HAVE TO ENSURE THAT FRAUDULENT

    CLAIMS ARE DETECTED AND STOPED BEFORE PROCESSING?

    ----

9. WHICH ORGANIZATIONS DO YOU INTERACT WITH DURING THE CLAIMS PROCESSING? AND WHAT TYPE OF DATA DO YOU SHARE WITH THEM?

INTERVIEW QUESTIONS FOR PAYROLL STAFF

Topic: "Effective use of ICTS for Efficient Civil Service Pensions Management in Kenya"

Purpose of Research: Partial Fulfillment for the Award of Master Degree in Information Technology

Matters to Note

ix. The information given on this questionnaire will be held in strict confidence and will be used only for the purpose of study

x. If any of the questions may not be appropriate to your circumstances, you are under no obligation to answer.

Section A: respondents background information

1. Gender of Respondent

    Male   ☐   Female   ☐

2. What is your age bracket?

    20 – 30 years ( )   31 – 40 years ( )   41 – 50 years ( )

    Over 50 years (   )

3. What is your highest level of education obtained?

        Nil   ( )

        Primary   ( )

        Secondary   ( )

        Tertiary   ( )

        University   ( )

4. DESIGNATION--

Section B: Research questionnaire

1. DESCRIBE THE CLAIM PAYMENT PROCESS?

    ----

2. NAME AND DESCRIBE THE LEVELS OF APPROVAL IN THE PAYMENT PROCESS?

----

3. HOW DO YOU DISBURSE THE PENSIONS PAYMENT TO THE BENEFICIARIES?

   ----

4. HOW DO YOU ENSURE THAT THE PAYMENTS ARE RECEIVED BY THE BENEFICIARIES?

   ----

5. HOW FREQUENTLY DO YOU DO RECONCILLIATION?

   ----

6. HOW DO YOU RECEIVE BACK PAYMENTS THAT DO NOT REACH THE BENEFICARIES?

   ----

7. HOW DO YOU PAY GRATUITIES / LUMPSUM AND MONTHLY PENSIONS?

   ----

8. DESCRIBE THE PAYROLL PROCESS?

   ----

9. HOW DO YOU RECONCILE THE PAYROLL?

----

10. DO YOU GATHER DATA FROM OUTSIDE THE DEPARTMENT IN ORDER TO PRODUCE YOUR ACCOUNTING REPORTS? IF YES, WHAT DATA FROM WHICH ORGANIZATIONS?

----

11. WHO ARE THE CONSUMERS OF YOUR REPORTS?

INTERVIEW QUESTIONS FOR ICT STAFF

Topic: "Effective use of ICTS for Efficient Civil Service Pensions Management in Kenya"

Purpose of Research: Partial Fulfillment for the Award of Master Degree in Information Technology

Matters to Note

xi. The information given on this questionnaire will be held in strict confidence and will be used only for the purpose of study

xii. If any of the questions may not be appropriate to your circumstances, you are under no obligation to answer.

Section A: respondents background information

1. Gender of Respondent

Male ☐   Female ☐

2. What is your age bracket?

20 – 30 years ( )   31 – 40 years ( )   41 – 50 years ( )

Over 50 years ( )

3. What is your highest level of education obtained?

Nil	( )
Primary	( )
Secondary	( )
Tertiary	( )
University	( )

4. DESIGNATION--

Section B: Research questionnaire

1. DOES THE DEPARTMENT HAVE AN ICT STRATEGY? Yes _____ No_____ IF YES, HOW IS THE ICT STRATEGY ALIGNED TO THE OVERALL VISION OF THE DEPARTMENT?

----

2. HOW MANY COMPUTERS DO YOU HAVE IN PENSIONS DEPARTMENT?

----

3. WHAT TRAINING HAS BEEN PROVIDED TO THE STAFF IN THE USE OF COMPUTERS?

   ----

4. DOES YOUR PENSIONS DEPARTMENT USE INTERNET? Yes _____ No_____

5. IS THE WEBSITE SPECIFICALLY DESIGNED TO BE ACCESSIBLE BY OLD PEOPLE? Yes _____ No_____

6. DOES THE ORGANIZATION OFFER SERVICES THROUGH THE INTERNET? Yes _____ No_____ IF YES, WHAT SERVICES?

   • Application forms download_____

   • Customer queries_____

   • Pensions Information_____

   • Etc_____

7. HOW FREQUENTLY IS THE WEBSITE UPDATED?

   • Less than two weeks _____

   • Two weeks_____

   • 1 Month____

   • 2 Months _____

   • More 2 Months_____

8. DOES THE ORGANIZATION HAVE AN IS? Yes _____ No_____ IF YES, IS IT A NETWORK BASED APPLICATION? Yes _____ No_____

9. DESCRIBE THE ICT PLATFORM IN TERMS OF OPERATING SYSTEM, NETWORK INFRASTRUCTURE, DATABASE AND APPLICATIONS USED IN PENSIONS DEPARTMENT?

   ----

10. TO THE EXTENT THAT YOUR ORGANIZATION INTERACTS WITH THE PUBLIC, HOW HAS IT ATTEMPTED TO MAKE ICT'S ACCESSIBLE TO THOSE WHO MAY NOT HAVE ACCESS TO ICT'S, AND ESPECIALLY TO PENSIONERS AS:

----

11. WHAT SUGGESTIONS DO YOU HAVE FOR MAKING ICT'S MORE ACCESSIBLE TO POOR AND ILLITERATE PENSIONERS?

----

12. CAN YOU SHARE INFORMATION ON ANY PROJECT THAT YOU ARE AWARE OF OR HAVE BEEN INVOLVED IN THAT YOU FEEL IS A PARTICULARLY GOOD OR BAD EXAMPLE OF THE WAY IN WHICH ICT'S ARE BEING USED TO DELIVER SERVICES?

----

13. IN YOUR OWN ASSE3SSMENT WHAT IS YOUR OVERALL ASSESSMENT OF THE POSSIBILITIES OFFERED BY ICT'S FOR DELIVERY OF SERVICES TO THE CITIZENS IN KENYA?

----

14. WHAT DO YOU SEE AS THE MAIN CONSTRAINTS?

INTERVIEW QUESTIONS FOR CUSTOMER CARE STAFF

Topic: "Effective use of ICTS for Efficient Civil Service Pensions Management in Kenya"

Purpose of Research: Partial Fulfillment for the Award of Master Degree in Information Technology

Matters to Note

xiii. The information given on this questionnaire will be held in strict confidence and will be used only for the purpose of study

xiv. If any of the questions may not be appropriate to your circumstances, you are under no obligation to answer.

Section A: respondents background information

1. Gender of Respondent

Male   ☐   Female ☐

2. What is your age bracket?

20 – 30 years ( )   31 – 40 years ( )   41 – 50 years ( )

Over 50 years ( )

3. What is your highest level of education obtained?

Nil	( )
Primary	( )
Secondary	( )
Tertiary	( )
University	( )

4. DESIGNATION---

Section B: Research questionnaire

1. HOW MANY PENSIONERS DO YOU RECEIVE IN A DAY?

    ----

2. WHAT ARE THE COMMON QUERIES YOU RECEIVE FROM PENSIONERS DAILY?

    ----

3. DO YOU THINK THESE QUERIES CAN BE ADDRESSED THROUGH THE USE OF SMS, TVs, and WEB/INTERNET?

----

4. WHAT ARE THE CHALLENGES/WEAKNESSES YOU FACE IN RESPONDING TO PENSIONERS QUEIRIES?

----

5. HOW DO YOU THINK THESE CHALLENGES CAN BE ADDRESSED BY INTEGRATING ICT IN YOUR OPERATIONS?

INTERVIEW QUESTIONS FOR MANAGEMENT STAFF

Topic: "Effective use of ICTS for Efficient Civil Service Pensions Management in Kenya"

Purpose of Research: Partial Fulfillment for the Award of Master Degree in Information Technology

Matters to Note

xv. The information given on this questionnaire will be held in strict confidence and will be used only for the purpose of study

xvi. If any of the questions may not be appropriate to your circumstances, you are under no obligation to answer.

Section A: respondents background information

1. Gender of Respondent

    Male   [ ]   Female [ ]

2. What is your age bracket?

    20 – 30 years ( )   31 – 40 years ( )   41 – 50 years ( )

    Over 50 years ( )

3. What is your highest level of education obtained?

    Nil   ( )

    Primary   ( )

    Secondary   ( )

    Tertiary   ( )

    University   ( )

4. DESIGNATION---

Section B: Research questionnaire

1. HOW MANY FILES DO YOU HAVE IN YOU REGISTRY?

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2. HOW LONG DO YOU TAKE TO LOCATE AND RETRIEVE A FILE FROM THE REGISTRY?

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3. HOW LONG DOES IT TAKE TO FILE COMMUNICATIONS FROM THE PENSIONERS?

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4. DO YOU USE ANY ELECTRONIC METHOD OF TRACKING FILE MOVEMENT? EXPLAIN

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5. DO YOU USE ANY ELECTRONIC DOCUMENT IMAGING OR MICROFILMING TOOLS? IF YES, WHICH ONES?

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6. WHAT PROBLEMS DO YOU FACE IN HANDLING PENSIONERS' FILES? NARRATE?