

**FACTORS AFFECTING DATA MIGRATION IN THE KENYA  
GOVERNMENT MINISTRIES**

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## Declaration

This research project is my original work and has not been submitted for a degree in any other University.

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This research project has been submitted for examination with my approval as university supervisor

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## **DEDICATION**

This work is dedicated to my family whose love, support and understanding made it possible for me to complete it. You have always been a source of Inspiration.

## ABSTRACT

The world has experienced rapid growth in the information and communication technology (ICT) sector, resulting in major transformation in the social, economic and business operations and processes. The ICT sector has helped to reduce the cost of communication, increase market information and facilitate doing business. This has brought the need for government and businesses to digitize their practices and processes hence the need for data migration. The purpose of the study was to establish the practices and factors affecting data migration in the Kenyan Government. The objectives of this study were to: establish the data migration practices in Kenya Government ministries; and determine the factors affecting data migration in Kenyan Government ministries. This study used descriptive survey design. In this case the target population was all ministries. Judgmental sampling was used to select 30 government departments. The research instrument was a questionnaire which was administered using “drop and pick later” method. One subject from each department was selected to respond to the questionnaire. Data was analyzed through percentages, mean scores, standard deviation and factor analysis. The presentation of findings from quantitative data was by use of tables. Study finding revealed that data migration in government follow some of the best practices in data migration. These include quality assurance and quality control of metadata, content preservation and quality review of the migrated data. Data migration is also challenged by many factors including financial constraint, inadequate personnel, and poor handling of original documents and inadequate resources and infrastructure for data migration. To tackle some of these challenges, government has increased funding to infrastructure and ICT sectors account and also enforcing standards and guidelines for human resource, infrastructure, processes and system and technology for the public office and public service. The following recommendations were made. First, the government departments should ensure that proper planning and budgeting is done even before the project starts. Secondly, every department engaged in data migration should ensure a consistent, high level of image quality across collections. Lastly, all data migration projects in government should follow best practices for data migration.

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# CHAPTER ONE: INTRODUCTION

## 1.1 Background of the study

The emerging trend towards digital application has made many organizations today to go digital hence data migration. Even with those that are already in digital, data migration still apply being driven by business mergers and acquisitions, movement from legacy systems to packaged solutions, Implementation of data warehouses and data marts, application system expansion, web access to legacy systems, movement to outsource and ASP solutions (Janssen, 2013).

Data migration is the conversion of data from one form to another or from one system to another. It is introducing new information systems, which means moving data. It involves converting paper documents into digital form, merging systems, upgrading systems, installing data warehouses and extending the life of legacy systems. Data migration is performed by the IT team in an organization. Data migration project is usually undertaken to replace or upgrade servers or storage equipment, for a website consolidation, to conduct server maintenance or to relocate a data center (Rouse, 2013).

Data migration is necessary when an organization decides to use a new computing systems or database management system that is incompatible with the current system. Also data migration is necessary when moving data from one storage device to another. In this context, data migration is the same as hierarchical storage management (HSM) (Beal, 2015). There are three main options to accomplish data migration: Merge the systems from the two companies into a brand new one. Another one is to migrate one of the systems to the other one. And lastly leave the systems as they are but create a common view on top of them - a data warehouse (Javlin, 2015).

### 1.1.1 The Concept of Data Migration

The concept of data migration has been described by several authors. According to Rintamaki (2010), data migration projects can include several steps, but at least two steps are required, data extraction, where data is read from the source database and data loading, where data is stored on the destination database. When migration is complete, verification and validation step is required to make sure that the data was accurately translated, is complete and that there is no loss of data. The verification process often involves a parallel run of both the old system and the new one. According to Janssen (2009), data migration is the process of transporting data between computers, Storage devices. It's a key consideration for any system implementation, upgrade or consolidation. Software programs are used to map system data for automated migration.

Data migration is categorized as storage migration, Database migration, application migration and business process migration. These scenarios are routine IT activities done after some specified intervals of time (TechnoPedia, 2011). Levine (2009) describes data migration as the process of making a copy of data and moving it from one system to another, preferably without disrupting active business processing. Then after the transfer, processing uses the new system.

Beal (2015), describes data migration as the process of translating data from one format to another. Data migration is necessary when an organization decides to use a new computing systems or database management system that is incompatible with the current system. Also a process of moving data from one storage device to another, in this context, data migration is the same as Hierarchical storage management (HSM).

Data migration occurs for a variety of reasons, Including: Upgrade or replacement of Servers and storage equipments, Website Consolidation, Server Maintenance, Data Centre relocation (TechnoPedia, 2008). According Levine (2009) data migration occurs because of the following reasons: Deployment of new application or operating systems. Take one of new users or business onto an existing system for example mergers and acquisitions. Changes to database schemas and

structures. Relocation of the data centre. Workload balancing and other performance related tuning.

Benefits of data migration includes: Improved corporate performance, Increased competitive advantage, Maximized ROI from enterprise applications, Efficient and effective business processes, Reduced uncertainty and risk, Lower costs of iterations and rewriting code, Reduced delays and wasted time, Reduced unexpected costs, A measurable and accurate view of data, Improved customer service, Better accountability and ability to meet compliance targets, and lastly additional value for shareholders and stakeholders (An Oracle White Paper, 2011). Successfully executed data migration projects are of prime importance for businesses. According to (Javlin) 2007, benefits of successful data migration project are: Cleaned and consolidated data, Lowered costs of system operations, reduced potential data loss and reduced Manpower.

### **1.1.2 Practices of Data Migration**

There are several practices to be considered when undertaking data migration according to Butler (2011). The first and which is key is maintaining quality of data. The second is methods used in data migration. These methods includes: evaluating complexity of data, establish data standards, define current and future business rules that applies to the data, information governance roles and responsibilities to be established. Lastly is choosing the right team members and managers to handle tasks and technologies (An Oracle White Paper, 2011).

White (2014) further gives several data management practices, first performing data quality assessment to ensure high level quality of data once the new database becomes available. Secondly is gathering migration requirements. Thirdly is identifying proper tool for new data environment, these goes hand in hand with the infrastructure which should be good too. Fourthly is risk management which is integral to the data management process. All data should be easily

accessible for any potential audits and that all information systems comply with Government, industry wide and company regulations. Fifth is change management. It requires users, customers, shareholders and all partners involved in the new system to be involved fully. Lastly data migration testing should be performed through the migration process to catch mistakes and issues while they are still fixable. Testing should be done to evaluate and approve the new system before being used fully.

### **1.1.3 Factors Affecting Data Migration**

Several factors affect data migration for data migrated to be: Relevant to the intended purpose, accurate when validated, integrity having coherent logical structure, consistent and easily understood, completeness to provide all the required information, valid within acceptable parameters for business, accessible to be exported to the target application and lastly to comply with regulatory standards (Oracle Corporate, 2011).

Several factors have been mentioned affecting data migration which includes. Data quality being a key factor, and it involves: assessment of the data needs and the business rules, definition of an optimum data quality level, audit of the data, data quality correction activities according to the data specifications (Burgess, 2007). Butler (2011) also brings out planning as key to effective data migration. Planning requires a clear understanding of design requirements which includes hardware requirements, replication requirements, scheduling and data value and data volume. Configure the hardware and install the migration software.

Study by Kurzweil (2014) reveals more factors affecting data migration projects. Which includes it being robust and resilient. That is the project needs to be able to manage in most situations. Secondly is it being rapid that is migration needs to execute within the defined time slot. Thirdly

is reporting, that is the project should provide progress. Fourthly is project should be recoverable. If a failure halts the progress of the migration, the solution needs to be able to recover from the point of failure. The fifth is it should be within budget. Lastly the project should be reusable. It's beneficial to reuse components of the migration in other projects

Study by Bell (2011) revealed several factors for data migration: First is to start data migration early. Second is to create meaningful, defensible cost and time estimates sooner the better. Third is to fully involve the organization in the data migration. Lastly is to use experienced migration practitioners as well as proven tools and methodology. A data migration project is usually a significant and risky undertaking and is not well suited to experimenting with new, unproven approaches. The safest approach is to use a proven data migration methodology and customize it for the specific needs of a given project. Study by Gallagher (2011) reveals more factors for data migration which includes: choosing a third party solution provider to assist in providing tools, systems, expertise, experience, and an independent outside perspective. Selecting a partner that understands insurance. Selecting a solution in which the results can be reconciled. Applying technology that is built for complex data transformation. And lastly, choosing technology that is modern and innovative.

Study from Computer Economics (2008), Reveals the following factors: maintaining the quality of the data. Success requires following a clearly defined process, automating procedures as much as possible, and paying close attention to detail to keep risks and costs within bounds. These activities include: Mapping that is creating a plan for converting source data into target data, Extracting that is moving data from the source system, Cleansing that is compacting and filtering data to improve its quality, Loading that is moving data to the target system, Finally verifying that is checking that the target system produces same results as the source system.

#### **1.1.4 Kenya Government Ministries**

The Government of Kenya has embraced technology in its operation. Things that were done manually have been converted into digital form. This has been brought about by the need to increase transparency and Government accountability. Various ministries are turning their records into digital format and also transferring their data from legacy systems to modern systems. Therefore, bringing about data migration. Among them is the ministry of Devolution, Hospitals, Land Registry, Ministry of Education, Counties and Libraries.

The Government has transformed its procurement process by the implementation Of (IFMIS) Integrated Financial Management Information System at the county level in an effort to increase transparency and eliminate opportunities for corruption. IFMIS e-Procurement was launched in august 2014. The system automates all procurement processes. All data pertaining procurement process has to be migrated from paper form and legacy systems to the e-procurement system.

The Judiciary Data migration started in 2011. It entails the conversion of the paper document into digital form and storing them in a centralized document management system. The project is aimed at migrating over 30 million records in the registries as a first step towards the automation of the justice system in Kenya. So far 2.5 million records have been migrated to the Information technology systems. The Government is also migrating data at the national Civil Registration comprising birth and Death records after which state departments will be required to digitize theirs to compete the e-government exercise (Mwirigi and Kinyanjui, 2012). This is a part of efforts to offer Government services electronically. Access to Government services and materials had in the past been slow, mainly because of the manual system operation.

Kenya is tackling regional disparity by setting up digital centers countrywide. In 2014 Government launched Huduma Kenya programme. It aims to transform public service delivery by providing citizens' access to various Public Services and information from One Stop Shop citizen service centers called Huduma Centers and through integrated technology platforms. Data has been migrated to an integrated system called the e-Government system. Another development that is within the county's E-Government initiative is the State Law Office Company registry's digitization exercise which resulted in the transformation of 25.5 million paper records to digital format in May, 2010 ( Mwirigi and Kinyanjui, 2012 ). Further, Google's ongoing global effort to bring historical and cultural heritage online has incorporated Kenya's initiative called Open Access to Public Legal Information into its programme. Government strategy to provide efficient and effective services delivery to citizens, led to initiation of e-Government strategy. E-Government strategy led to rapid result initiative in which the Government went digital. Hence investing in IT, and doing data migration to migrate their data to systems and databases. However, there have been reported challenges in data migration efforts. One of the challenges is lack of common standards or guidelines that would allow easy citizen accesses to the information using current and emerging technologies (Amollo, 2011). Though Article 35 of the constitution of Kenya establishes the citizens' right of access to public information, actual access remains limited.

To tackle some of these challenges, Kenya Standardization Body, Kenya Bureau of standards (KEBS) have intervened to solve the standardization problem by establishing a technical Committee to help set standards for digital migration in record centers and archives. The ISO TC46 SC11 committee was established to develop standards in archives/ record management which cover standardization of principles for the creation and management of documents,



records and archives as evidence of transactions and covering all media including digital multimedia and paper, archives and record management (Amollo, 2011).

Government has increased funding, to infrastructure, and ICT sector on the national Budget. In the 2015/2016 budget estimates, Cabinet Secretary increased allocation to the energy, infrastructure and ICT sectors account for 27.3 per cent of total sectoral funding in 2015/16 compared with 21.7 per cent in 2014/2015. This will enable the Government to upgrade to better machines and expertise. Under ICT Authority. They ensure that Government ICT projects are cost-effective, integrated and aligned with national objectives, ICTA provides ICT governance to the public sector. As a key mandate ICTA sets and enforce ICT standards and guidelines for the human resource, infrastructure, processes and system and technology for the public office and public service. The authority carries this through the following: Oversight, Project management office (PMO) and Government enterprise architecture (GEA).

There is need for more action to ensure that data migration process is implemented successfully. This study sought to establish the practices, challenges and recommend measures required to deal with data migration projects to make them a success.

## **1.2 Research Problem**

Data migration in organizations today has increased, being driven by several factors which includes: changing technology, organizations need changing and increase in data in organizations. Consequently, several studies have been done relating to digital migration. Study by Arthur et al (2004) revealed that data migration offers many benefits including: increased accessibility, increased functionality, output capability to other media, systematic and purposeful collaboration, identification and selection of materials, Management and delivery of Public services. This study however was done in Canada and the context could be different in Kenya.

For successful data migration, best practices need to be adopted to ensure that the process is a success. Best practice equates to any procedure which, when properly applied, consistently yields superior results, and is therefore used as a reference point in evaluating the effectiveness of alternative methods of accomplishing the same task. A study by Yan (2004) investigated the best practices, standards and techniques for data migration in Florida State in USA. The study established that different state departments had adopted their own path regard to data migration. Study Katz et al (2013) in Latin America established that standards and guidelines associated with data migration practices vary from project to project and from country to country. This Study established that each data migration project had its own practices and strategies which were not standard. A study by Ray (2004) revealed that all organization with an interest in data migration are concerned about preservation. The question of what to migrate, the media to be included in the collection, the best way to protect digital information from degradation and the plan for data migration must be answered. Another study by Vrana (2011) revealed that there are other challenges for data migration projects. One of the main problems is that digital images may exist in various formats on different computerized networks making migration complex.

Data migration in the Government of Kenya is one of the strategic pillars of the national ICT Master plan (Mwirigi and Kinyanjui, 2013). Kenya Government is focused on migrating its data into more efficient and effective systems to improve service delivery. Already several Government ministries are in the process of data migration. Departments like procurement were badly in need of automation as their inefficiency was causing Government a lot in the high cost of procurement of goods and services. Data migration is being implemented from the county level in order to streamline the procurement process. Data migration in other Government institutions like ministry of Land and Registry of Companies and business is expected to cut corruption and make the process easier and straightforward. Data migration in Kenya has

progressed slowly than in other countries in the world. Despite the fact that data migration is continuing and growing in Kenya, little related researches on it have been done. For instance, the reasons for the lack of progress since the initiation of the national e-Government projects in Kenya since 2004. Little literature has been published about data migration in Kenya.

Study by Mwirigi and Kinyanjui (2012) focused data migration and preservation of local content in the national Library of Kenya. This was a case Study focused on library in Kenya. The findings from the study though they gave insight into data migration could not be generalized to Government data migration. In view of this, this study therefore sought to determine the factors that lead to successful data migration in organizations. These researches left questions which are necessary in understanding data migration with view to enhancing success. This study sought to answer the following questions; what are the practices involved in data migration in Kenya Government departments? What are the challenges that data migration projects in Kenya Government departments have encountered? What should be done to ensure successful data migration in the Kenya Government?

### **1.3 Research Objectives**

The Objective of the study is to:

1. Establish the data migration practices in Kenya Government ministries.
2. Determine the factors affecting data migration in Kenya Government ministries.

### **1.4 Value of the Study**

The findings from this study will be useful to Government departments that have data migration projects. The study will give an in depth insight on the information about the best practices to be

done during data migration to ensure success. The study will identify the challenges that have hindered the success of data migration in organizations and make recommendations on how they can be overcome by performing the right practices. This will give the data migration project implementers a feel of what needs to be done for the data migration projects in other public organizations and the Government in general.

The study seeks to inform the management and chief executive officer of organizations of their center role in ensuring successful data migration. Change of attitude towards technology use. Dealing away with legacy systems and embracing new better technology. Learning the New Technology and working with it. Their need to support research and the Experts doing data migration by providing them with financial support, moral support and any other necessary support.

The study will also be of value to theory and scholarship. The study findings will be useful for theory. This study will add to the body of knowledge on e-Government implementation. This will be useful to scholars, teachers and researchers in the study area. There is a dearth of local research on challenges to e-Government project implementation and this study will add to that important area. Scholars and academicians on e-Government can use the study as a reference material in their writing or teaching. Researchers can also use this study for their conceptual argument in their studies. Further researches can also be done to improve on the limitations that will be documented in this study.

The departments migrating their data can use findings from this study to analyze deeply the experiences of the Government department's data migration project from the point of view of their employees who are involved in the project. This study will also identify practices and challenges facing data migration projects implementation. The department can therefore use the study findings to establish the challenges behind the slow implementation of the projects and can

act accordingly. The study will also explore the major causes of the issues and provide factors and policy recommendation to address them. This will give the departments an alternative way of dealing with the challenges which can turn around the projects implementation.

The study findings can also be useful to the Government in general and it's other public agencies which are in the process of implementing e-Government projects. The study findings will examine the challenges in the Kenyan Government data migration project whose findings can be generalizable to other Government agencies due to the similar context. The study findings therefore can be applicable in streamlining implementation of e-Government projects to give value for money and meet set targets in terms of time budget and adoption.

Many Organizations today are merging because of various reasons mainly being to be more productive and benefit from the merger and so their data has to be integrated to a new system and this call s for data migration. This study will provide useful information of the challenges involved and how to overcome such challenges.

## **CHAPTER TWO: LITERATURE REVIEW**

## **2.1 Introduction**

This chapter is devoted to reviewing literature relevant to the current study. It provides critical look at the theoretical literature on best practices for data migration Success, Challenges in data migration projects and strategies that should be applied in data migration projects. This chapter further present's empirical review whether earlier studies on practices, challenges and factors in data migration projects are presented. Relevant literature is presented and discussed under different sub sections as outlined hereunder.

## **2.2 Data Migration Practices**

The practices adopted in the data migration projects affect the success of the data migration project. Globanet, (2015) states that, when data is being migrated between dissimilar systems, the level of detail required for a successful data migration increases. And this makes organization to be scared from completing them on their own. Because there is a high risk factor if the migration is not correctly done, using right technology. The organization wants to ensure that the data is retained in its original format. More specifically all content and metadata must remain unchanged, and detailed reporting should be provided to ensure this requirement is satisfied.

Bell (2011) describes Data migration as difficult but unavoidable. He data migration should start early by understanding legacy data assets. Then to use the knowledge gained about the data assets to develop defendable time and cost estimates to attract management attention, resources and commitment. Datanomic Ltd, (2001) states that the essence of data migration is to improve corporate performance and deliver competitive advantage. For successful data migration, data must be given the attention it deserves and proper planning.

According to Oracle White Paper (2011), essential steps to successful data migration includes: First planning, define what is achievable in terms of what the data sources will support and what is reasonable. Second is diligence: The scoping refinement is integral to the success of the migration. Third is budget and timeline. Refining the scope makes it easier to plan how the project will be resourced and to secure agreement from the business. Lastly is data governance. All corporate data ultimately belongs to business users, with technical support from the IT department. Therefore, migrations require a data governance board led by business users committed to the success of the new system and empowered to make decisions and drive actions. Therefore considering the possible business, legal, financial and other consequences of a poorly data migration, it's important to have a well-defined plan and a data migration expert.

According to Globanet (2015), there are also steps that organization can take before and during data migration to reduce the risk, lower costs and complete their migration on time. Before migration is: Identifying best-of-breed migration vendor to guide the organization through the migration process. Perform a review of data classification and retention standards. Deciding how to integrate the migration with other critical legal, compliance and/or IT initiatives. Communicate with end users and other stakeholders, informing them of the migration; Find out from the organization's legal and compliance departments how to handle special Circumstances. During the implementation and testing phases of the migration process, thoroughly review and test the procedures the migration specialist puts in place, and review the success criteria to ensure that all goals and milestones are met. Document any issues and escalate them to the migration specialist for resolutions or alternative options. Then during Migration: Communicating to end users and other stakeholders, Avoiding changing the environments during the course of the migration. Allow time for regular backups of environments, which may require pausing migrations.

According to Butler (2011), steps that organization should take after migration includes: Reviewing all chain of custody reports, paying special attention to items that failed to migrate. Work with the migration vendor to determine whether these failed items can be captured or migrated by some other means, and document what is missing and why it could not be migrated for the organization's compliance and legal departments. Delete the original data as well as any backups of the original data, unless the organization's legal department provides instruction to the contrary.

Zevenbergen (2002) also states that by following and applying these best practices of: Analyze, define the scope of the project of data migration, and to define from which applications you want to migrate. Then Design, mapping defined and discussed with the business users. Followed by deploying using templates, and lastly operation using stable set of data. You can achieve a successful project outcome.

### **2.3 Factors Affecting Data Migration**

Key factor affecting data migration both during and after the transition is maintaining the quality of the data. It is following a clearly defined process, automating procedures as much as possible, and paying close attention to detail to keep risks and costs within bounds. These activities include: mapping, extracting, cleansing, loading, and verifying (Computer Economics, 2015)

Study by Kurzweil (2014) reveals that one of the key factors affecting data migration project is that it should be robust and resilient. That is the project needs to be able to manage in most situations, especially when there are high volumes of data, the project must be prepared to handle errors in source and target connections as well as disk space and memory problems. Secondly is it should be rapid, that is migration needs to execute within the defined time slot. Thirdly is



reporting, that is the project should provide progress indicators and once complete, it should have the ability to reconcile and audit the progress. Fourthly is project should be recoverable. If a failure halts the progress of the migration, the solution needs to be able to recover from the point of failure. The fifth is the project needs to be within budget. The margin should be relatively small compared to the initial cost estimated for the project. Lastly the project should be reusable. It's beneficial to reuse components of the migration in other projects.

Factors affecting data migration should ensure the data migrated are retained in its original format. More specifically all content and metadata must remain unchanged, and detailed reporting should be provided to ensure this requirement is satisfied. These data also should be: Relevant to the intended purpose, accurate when validated, integrity having coherent logical structure, consistent and easily understood, completeness to provide all the required information, valid within acceptable parameters for business, accessible to be exported to the target application and lastly it should comply with regulatory standards (Oracle Corporate, 2011).

Several factors have been cited affecting data migration. Data quality being a key factor which should be performed to ensure high level quality once the new database becomes available users. And it should involve removal of duplicate content and all files that are not relevant to the business processes, and if possible creation of a master data file. It also involves: assessment of the data needs and the business rules, definition of an optimum data quality level, audit of the data, data quality correction activities according to the data specifications (Burgess, 2007). Butler (2011) also brings out planning as key to effective data migration. Planning requires a clear understanding of design requirements which includes hardware requirements, replication requirements, scheduling and data value and data volume. Configure the hardware and install the migration software.

According to Rintamaki (2010), there are five primary factors that affect data migration: First is performance, how quickly the data can be migrated. Secondly is primary volume/source data protection, if something goes wrong, the migration can be terminated and restarted or continued later without any loss of data. Thirdly is tiered storage, moving data between different storage media without disruption. Fourth is Multivendor environment, which the software allows for the source system and target system to be from different vendors. Lastly application downtime, how long the system will be down during the migration.

Involving business users and data experts in the migration project is factor driving for data migration success. To fulfill your data migration needs, you must include a data governance strategy that provides leadership and direction for user input. Effective planning will allow you to mitigate the risks associated with the project (SAP Thought Leadership, 2008).

Study by Seiner (2011), points out that data migration is difficult but unavoidable; it should start immediately on understanding legacy data assets. Using the knowledge gained about the data assets to develop defendable time and cost estimates to attract management attention, resources and commitment. Ensuring the business is fully engaged and getting the best possible leverage from scarce internal SMEs. And also, data migration risks can be reduced by using proven tools, methods and specialist expertise.

More factors are mentioned for data migration which includes: - Need for a well-defined target data structure model. - In-depth understanding of the functionality of the source data structure. - Constant changes on the target model design have a knock-on effect on conversion process design. - Source data quality, if poor, needs to be cleansed in order to be successfully migrated. - Degree of complexity of the target model in relation to the source data model. - The differences in task definitions between the source and target data structures. Therefore it is important to have

a sound, methodological approach by which organizations can undertake Data Conversion projects, which will help to confront unpleasant surprises on later stages and resolve those issues fast and effectively (Key Management group, inc, 2013).

There are also several challenges associated with data migration. According to study by Janssen (2009) reveals that data migration may impact business operations when it creates extended downtime, Compatibility and performance issues. Such impact can be reduced by planning effectively, Using right technology, implementation and validation. More challenges are revealed by Janssen including: Users might resist the change due to various reasons such as new system and new working environment that they are not familiar with. And so migration documentation facilitates tracking and reduces future migration costs and risks.

Liu (2004) in a study of the best practices, standards and techniques for data migration for library materials in USA established that the main technological issues, problems and concerns for libraries that were migrating data, Methods for capturing printed information. The equipment being used for the process in many instances was unreliable providing low quality images which was a challenge in many data migration projects. Much attention focused on the reliability of equipment and software. The study by Lui (2004) revealed that the data migration process should not require too many steps and the equipment should be easy to use. The study also reveals that the image processing software should allow for curvature correction and tidying of image created, meaning the record remains in original condition. Another technological issue was deciding on the size the digital images to be migrated on the library website. Larger images took more time for the user to download. Another issue surrounded the storage of thousands of images files on the document management system.

According to Wikibon (2008), data migration are rarely seen as value adding technological activity, but rather as a unnecessary activity deriving from the need to consolidate storage, implement stronger technology controls, upgrade or replace systems and merge or rationalize technologies. This makes keeping management focus – the holders of IT budget a challenge. A stronger business case need to be presented to them that outlines the business advantages of data migration, justified in traditional cost benefit form. Where this business advantage may not be direct in the business. Another challenge is data migration tools are expensive and a good data analyst and developers are expensive too in major IT markets.

According to Merrill (2012), Several challenges for data migration are mentioned which includes: Unexpected or Extended Downtime: For data migration projects that include mission-critical business data, the risk of impacting sales operations is high; the loss of availability or access to the data could directly impact the profit and loss of the business. When data migration projects last longer than planned, resources are used for longer than anticipated. The schedule overrun can also impact or delay other planned IT projects and impact the business. Often, data migration is part of a larger overall project, and the delay in the data migration project affects the success of the larger overall project. Budget Overrun As with all IT projects, a significant risk is the cost associated with any budget overrun. This can directly affect budgeting for other IT projects and affect the profit-loss statement for the business.

According to Levine (2009) more data migration challenges are mentioned which includes: Migration acceptance criteria may not be defined. Data at the end user is often too distributed to be migrated easily. Poor support from storage vendors sometimes making migration all the more taxing and costing. Budgets may limit technology options for performing migrations. Migration might be done as part of a larger chain of dependencies such as operating systems upgrade, application upgrade, and database structural changes thereby increasing complexity. Data

requirements are not clearly defined that is the data rules for integrity, controls, security and recoverability are not defined well and in the absence of this rules data is migrated incorrectly.

Data migration requires a lot of resources. Most institutions apart from MS Excel, they do not use any other data processing software for analyzing and migrating their data such as SSP, SAS. Data migration also requires experts to migrate the data and these experts are expensive to hire them. There is inadequate capacity to effectively manage data migration. Poor Maintenance/ lack of upgrading of old computers hamper effective management of data. Lack of internal data protection a procedure, which hinders data migration as data most often considered classified (Amollo, 2011).

## **2.4 Summary**

Data migration is a process that most companies bump in to sooner or later. Although it might be tempting to postpone the first data migration due to all the risks involved, once it is done most companies perform data migration on a regular basis. Majority of all data migration projects fail to be completed in time and/or on budget, it is easy to see a need of more understanding of the data migration process. There are several different steps to take in order to increase the likelihood of a successful data migration as discussed in this chapter. Several practices have been mention and factors for successful data migration. Challenges too have been mentioned and ways to go about to ensuring successful data migration.

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

This chapter discusses the methodology that was used in the study. This covers the research design, study population, sampling technique, sample size, data collection methods and data analysis. The methodology included using logical methods in collecting data. The nature of the study guided the design approach to ensure appropriate data within the scope of the research study was obtained to answer the research questions.

### **3.2 Research Design**

This study applied descriptive survey design. The method is designed to describe the characteristics or behaviors of a particular population in a systematic and accurate fashion and to focus on a number of subjects which have similar observable characteristics. Descriptive research is designed to provide a picture of a situation as it naturally happens. It may be used to justify current practice and make judgment and also to develop theories (Creswell, 2008). For the purpose of this study, descriptive research was used to obtain a picture of data migration practices and factors affecting success applied in the Kenyan Government with a view to improving the data migration process in the Government departments.

Descriptive survey is aimed at getting information about practices, challenges and factors affecting success of data migration project in the Government departments of Government of Kenya so that the findings can be applied to improve practice (Mugenda and Mugenda, 2003). This makes descriptive study well suited for this study where the research instrument was applied to seek information from project leaders in Government departments that had rolled out data migration projects.

### **3.3 Population of Study**

The population is the total number of respondents selected for the study. In this case the target population was all ministries in the Government of Kenya as at 30<sup>th</sup> June 2015. (See Appendix 2)

### **3.4 Sampling**

In this study, judgmental sampling was applied to select 30 Government departments that had rolled out or were in the process of implementing data migration project. They all had created records which were later preserved permanently. The respondents selected for the study had the knowledge and experience on the data migration projects.

### **3.5 Data Collection**

The research instrument was a questionnaire. The questionnaire had both closed and open-ended questions. The questionnaire had three sections. Section A captures the demographic information of the respondents and the departments. Section B captured data relating to practices adopted in the data migration project. Section C covers factors affecting data migration and the challenges faced in the project. The sample questionnaire is provided in Appendix I.

The researcher administered the questionnaires using “drop and pick later” method. One subject from each department (preferably the project leader) was selected to respond to the questionnaire.

### **3.6 Data Analysis**

All questionnaires from the respondents was verified and checked for completeness. The data coded was entered into SPSS (Software Package for Social Sciences) for windows which generated percentages, means, frequency distributions and other results of analysis. Section A regarding demographics was analyzed based on frequencies and percentages. Data relating to Section B and C was analyzed through means and standard deviation. Factor analysis was done on data captured through Section B and C. The purpose of factor analysis was to reduce data captured in the major practices and factors affecting data migration in the Kenyan Government to a small set of summary variables to describe variability among observed and correlated variables.



## **CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND DISCUSSION**

### **4.1 Introduction**

This chapter discusses data analysis, findings and discussion of the study. The objective of the study was to establish the practices and factors affecting data migration in Kenya Government Ministries.

Data was collected through questionnaires which were sent to project leaders in government ministries that had data migration projects or had completed data migration projects. Out of 35 questionnaires administered to the respondents, 30 of them were returned for data analysis. This was response rate of 86% which was considered adequate for the research purpose. The respondents included Project team leaders, IT Officers, IT directors, Project team members and IT project managers among others. The analysis presented in the following sections is as per the 30 returned questionnaires.

### **4.2 Demographic Information**

This section provides the findings of the study on the general and demographic information. Findings presented in this section include gender of the respondents, Age, Job title and the number of years the respondents had worked in the department. Other general information

presented in this section includes sources of the project funding, Stage of completion of the data migration project. The personnel undertaking the data migration project was also included.

#### 4.2.1 Gender of Respondents

One of the general questions involved the gender of the responding subjects. Results are presented in Table 4.2.1

**Table 4.2.1: Gender of Respondents**

Gender	Frequency	Percent ( % )
Male	20	67
Female	10	33
Total	30	100

**Source: Researcher, 2015**

Study results presented in Table 4.2.1 indicates that 67% of the respondents were male while 33% being female. From the results most of the respondents were male.

#### 4.2.2 Age of the Respondents

The study sought to find out the age of the respondents which is captured in Table 4.2.2

**Table 4.2.2: Age of the Respondents**

Age in Years	Frequency	Percent ( % )
18-25	3	10
26-30	9	30
31-35	11	37
36-40	5	17
41-45	1	3
46-50	1	3

Above 50	0	0
Total	30	100

**Source: Researcher, 2015**

Results presented in Table 4.2.2 indicate that the respondents to the questionnaires were very varied in relation to age where 40% were below 30 years, 54% aged between 31 and 40years, with no respondent was over 50 years of age. This result indicates that those who participate in the digitization projects are either middle aged or young.

#### **4.2.3 Years of Experience in Department**

The years respondents had worked in the department was captured in Table 4.2.3.

**Table 4.2.3: Years of experience in Department**

<b>Years of Experience</b>	<b>Frequency</b>	<b>Percent ( % )</b>
Below three years	4	13
3-6 years	11	37
7-10 years	12	40
Above 10 years	3	10
<b>Total</b>	<b>30</b>	<b>100</b>

**Source: Researcher, 2015**

Study findings presented in Table 4.2.3 indicate that 77% of the respondents had worked in the department between 3 and 10 years. While those who had more than 10 years in the same department were 10%. These results give the impression that most respondents had worked in the same organization long enough. This therefore indicated that the respondents had valuable information to provide for the study purpose.

#### **4.2.4 Year the Project Commenced**

The year the project was started was also inquired where responses were analyzed and presented in Table 4.2.4.

**Table 4.2.4: Year the Project Commenced**

<b>Year</b>	<b>Frequency</b>	<b>Percent ( % )</b>
2011	12	40
2012	6	20
2013	7	23
2014	2	7
2015	3	10
<b>Total</b>	<b>30</b>	<b>100</b>

**Source: Researcher, 2015**

Results presented in Table 4.2.4 reveal that data migration projects that started in 2011 were 40%, those that started in 2012 were 20%, and those that started in 2013 being 23%. A few started in 2014 which is 7% and also a few in 2015 which was 10%. This points to the fact that data migration in Kenya Government is fairly a new concept as there was no project that was more than five years old.

#### **4.2.5 Source of Data Migration Project Funding**

How data migration project was funded was also inquired. A project can be funded from internal funds or funds that are external to the department implementing the project. Other projects were funded by the grant awarding agencies while a few more were funded by both the departments and grants. The results from this question are presented in Table 4.2.5

**Table 4.2.5: Source of Project Funding**

Funding Source	Frequency	Percent ( % )
Department Only	20	67
External Sources	7	23
Grant awarding agencies only	2	7
Departments and grants	1	3
<b>Total</b>	<b>30</b>	<b>100</b>

**Source: Researcher, 2015**

Study results presented in Table 4.2.4 indicate that 67% of the projects were funded wholly by the department, 23% were funded from external sources with 3% only being jointly funded by the department and grant awarding agencies. Those projects that were funded wholly by grant awarding agencies were 7%.

#### **4.2.6 Stage of Completion**

Another factor that was investigated was the stage of completion of the data migration project. Respondents were required to indicate the percentage of work completed on the project with those completed being rated at 100%. Results are presented in Table 4.2.6.

**Table 4.2.6: Stage of Completion**

Completion stage	Frequency	Percent ( % )
Less than 25%	1	3
25%	3	10
50%	8	27
75%	10	33
100%	8	27
<b>Total</b>	<b>30</b>	<b>100</b>

**Source: Researcher, 2015**

Study results as presented in Table 4.2.6 reveal that 27% of data migration project had completed. Those that were less than 25% completed were 3% while those that were around 50% complete were 27%.

#### **4.2.7 Personnel Undertaking the Data Migration Project**

This study further inquired on the personnel that were undertaking the data migration project. Results are presented in Table 4.2.7

**Table 4.2.7: Personnel Undertaking Data Migration Project**

<b>Project Personnel</b>	<b>Frequency</b>	<b>Percent ( % )</b>
IT department staff	17	57
Consultant	10	33
Both	3	10
<b>Total</b>	<b>30</b>	<b>100</b>

**Source: Researcher, 2015**

Results as presented in Table 4.2.7 reveal that 57% of the data migration projects were undertaken by the IT department staff. 33% of the projects were undertaken by consultants and only 10% of the projects were undertaken by the departmental staff in conjunction with consultants.

#### **4.2.8 Material Being Migrated**

The study further sought to establish the kind of materials that were or had been migrated. Results are presented in Table 4.2.8.

**Table 4.2.8: Materials being migrated**

<b>Materials migrated</b>	<b>Frequency</b>	<b>Percent ( % )</b>
Images	2	6
Texts	9	30
Numbers	3	10
Both	16	54
<b>Total</b>	<b>30</b>	<b>100</b>

**Source: Researcher, 2015**

Results presented in Table 4.2.8 indicates that, 54% of the migrated data were both images, texts and numbers. 10% migrated materials was number, 30% migrated materials were texts and only 6% of the migrated data was images.

### **4.3 Practices in the Data Migration**

This research study had an objective of establishing the practices involved in the data migration projects undertaken by the departments in the Kenyan government.

#### **4.3.1 Descriptive Statistics for Practices in Data Migration**

Respondents were required to indicate the extent to which each of the listed practice was applied in the data migration project in the department. The rating that was used was 1-No extent, 2-Small Extent, 3- Moderate extent, 4-Great Extent, 5-Very great extent. Responses were analyzed through mean scores. Mean sores were interpreted as follows: 1- 1.5 as No extent; 1.5 – 2.5 as Small Extent; 2.5 – 3.5 as Moderate extent; 3.5 – 4.5 as Great extent and above 4.5 as Very great extent. The standard deviation describes the distribution of the responses to mean. It provides an indication of how far individual responses to each factor vary from the mean. A standard deviation of more than one indicates a great variation I the response meaning respondents did not

have a consensus on their views, while a standard deviation of less than 1 indicates less variation in the responses. The results from the analysis are presented in Table 4.3.1

**Table 4.3.1: Practices in Data Migration**

<b>Practices</b>	<b>Mean Score</b>	<b>Std Deviation</b>
Specify the need for doing the data migration	3.93	.640
Planning, budgeting and monitoring	3.83	.950
Selection of data migration processes	3.53	.730
Assessment of data migration processes	3.47	.860
Prioritization of data migration processes	3.57	1.165
Communication and coordination of data migration project	3.80	.847
Setting up the necessary technical infrastructure and expertise	3.67	1.028
Setting of equipment and components	3.33	.994
Planning on how to track records through the process	3.50	.861
Setting data migration copy status and records management standards.	3.53	1.042
Evaluating the physical condition of records and readiness for migration	3.27	1.015
Determination of the format to be used in workflow and system standardization	3.47	.900
Selection of documents for data migration	3.60	.814
Preparation for data migration. (Hardware, software environment)	3.60	.968
Moving original materials	3.50	.861



Quality assurance and quality control of data	3.50	1.075
Quality management, quality assurance and quality control of digital copies	3.67	.994
Technical verification of digital objects to technical standards	3.13	1.042
Quality review of the migrated data	3.67	.884
Linking the migrated data to all appropriate IT Systems	3.53	.900
Staff Training	3.50	.938
Project assessment, evaluation and reporting	3.27	.944

**Source: Researcher, 2015**

Study results presented in Table 4.3.1 indicate that practices that were followed to a great extent in the data migration projects included specifying the need for doing the data migration (3.93), Planning, budgeting and monitoring (3.83) and Communication and coordination of data migration project (3.80). More Practices that were involved to a great extent included setting up the necessary technical infrastructure and expertise (3.67), Quality management, quality assurance and quality control of digital copies (3.67), quality review of the migrated data (3.67), Selection of documents for data migration (3.60) and preparation for data migration. (Hardware, software environment) (3.60). However the study established that there were practices that were involved to a moderate extent but were important including project assessment, evaluation and reporting (3.27) and technical verification of digital objects to technical standards (3.13).

The practices with standard deviation of more than 1 indicate that respondents had no consensus while less than 1 indicate there was consensus on the responses obtained.

#### **4.3.2 Factor Analysis on Practices**

Responses on practices were further subjected to factor analysis to establish the main factors in the practices in data migration projects.

#### **4.3.2.1 Communalities**

Communality is the proportion of variance that each item has in common with other items. The proportion of variance that is unique to each item is then the respective item's total variance minus the communality. Table 4.3.2 of communalities shows how much of the variance in the variables has been accounted for by the extracted factors. Communality matrix was extracted from the factor analysis where Table 4.3.2 shows the communalities.

**Table 4.3.2: Factor Analysis (Communalities)**

Data Migration Practices	Initial	Extraction
Specify the need for doing the data migration	1.000	.627
Planning, budgeting and monitoring	1.000	.770
Selection of data migration processes	1.000	.769
Assessment of data migration processes	1.000	.694
Prioritization of data migration processes	1.000	.784
Communication and coordination of data migration project	1.000	.555
Setting up the necessary technical infrastructure and expertise	1.000	.727
Setting of equipment and components	1.000	.805
Planning on how to track records through the process	1.000	.570
Setting data migration copy status and records management standards.	1.000	.829
Evaluating the physical condition of records and readiness for migration	1.000	.717
Determination of the format to be used in workflow and system standardization	1.000	.693
Selection of documents for data migration	1.000	.833
Preparation for data migration. (Hardware , software environment)	1.000	.791
Moving original materials	1.000	.629
Quality assurance and quality control of data	1.000	.820
Quality management, quality assurance and quality control of digital copies	1.000	.843
Technical verification of digital objects to technical standards	1.000	.670
Quality review of the migrated data	1.000	.695
Linking the migrated data to all appropriate IT Systems	1.000	.697
Staff Training	1.000	.908
Project assessment, evaluation and reporting	1.000	.825

Results presented in Table 4.3.2 on communalities reveal how much of the variance in each of the original variables is explained by the extracted factors. Higher communalities are desirable. If communality for a variable is less than 50%, it is a candidate for exclusion from the analysis because the factor solution contains less than half of the variance in the original variable, and explanatory power of that variable might be better represented by the individual variable.

#### 4.3.2.2 Factor Extraction

This section shows all the factors extractable from the analysis along with their Eigen values, the percent of variance attributable to each factor, and the cumulative variance of the factor and the previous factors. Factors were extracted using principal factor analysis with 6 factors being extracted as indicated in Table 4.3.3.

The Table presents total variance of all the factors. Principal component analysis was used to extract factors which totaled to 22. Eigen values indicate the relative importance of each factor accounting for a particular set and hence those with small Eigen value were left out. According to Table 4.3.3, only six factors were significant for the analysis. We notice that the first factor accounts for 32.818% of the variance, the second 13.520% of the variance, the third 9.188% of the variance, the fourth 7.449% of the variance, the fifth 5.998% of the variance, and the sixth 4.886% of the total variance. All the remaining factors are not significant.

**Table 4.3.3: Factor Extraction(Total Variance Explained)**

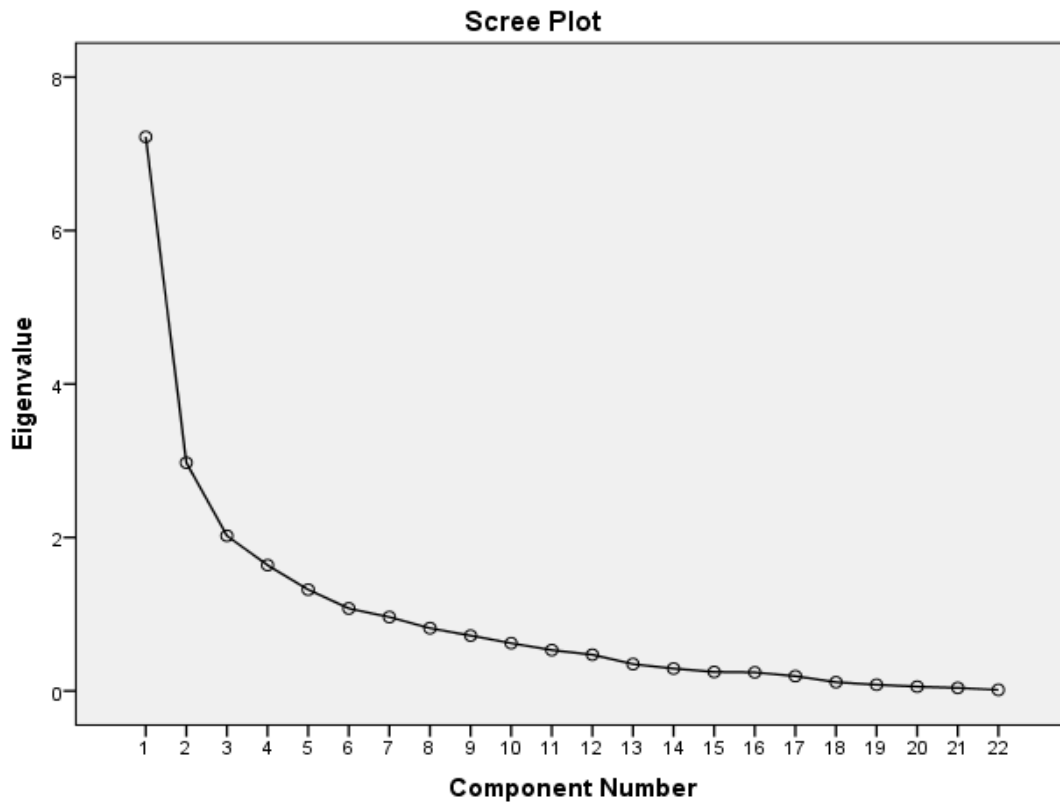
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %

1	7.220	32.818	32.818	7.220	32.818	32.818	4.371	19.867	19.867
2	2.974	13.520	46.338	2.974	13.520	46.338	2.952	13.419	33.286
3	2.021	9.188	55.526	2.021	9.188	55.526	2.934	13.338	46.624
4	1.639	7.449	62.975	1.639	7.449	62.975	2.464	11.200	57.824
5	1.320	5.998	68.973	1.320	5.998	68.973	2.143	9.741	67.565
6	1.075	4.886	73.860	1.075	4.886	73.860	1.385	6.294	73.860
7	.963	4.377	78.236						
8	.817	3.715	81.951						
9	.721	3.276	85.227						
10	.621	2.824	88.051						
11	.532	2.419	90.470						
12	.472	2.146	92.615						
13	.350	1.591	94.206						
14	.291	1.321	95.527						
15	.247	1.124	96.651						
16	.241	1.097	97.748						
17	.193	.878	98.626						
18	.114	.517	99.142						
19	.080	.364	99.506						
20	.055	.252	99.758						
21	.040	.182	99.940						
22	.013	.060	100.000						

### 4.3.2.3 Scree Plot

A scree plot which is a plot of the factor Eigen values against the component number.

The scree plot in Figure 4.3.1 shows the factors that were extracted by indicating an elbow in the graph. In this case, 6 factors were extracted.



**Figure 4.3.1: Scree plot**

The Scree Plot is plot of factor Eigen Values against the components number. According to figure 4.3.2, we only consider 6 factors because the curve tends to flatten from the sixth component onwards, due to relatively low factor Eigen value.

#### 4.3.2.4 Component Matrix

The Table 4.3.4 shows the loadings of the thirty variables on the six factors extracted. The higher the absolute value of the loading, the more the factor contributes to the variable. A component matrix containing the Eigen values in respect to each factor was extracted from the factor analysis. The results are presented in Table 4.3.4.

**Table 4.3.4:Factor Analysis(Component Matrix)**

	Component					
	1	2	3	4	5	6
Specify the need for doing the data migration	-0.197	0.299	0.024	-0.045	0.058	0.129
Planning, budgeting and monitoring	-0.072	-0.086	0.004	0.42	0.025	-0.055
Selection of data migration processes	0.043	0.205	-0.035	-0.032	0.203	-0.182
Assessment of data migration processes	-0.083	0.301	0.051	-0.064	-0.011	0.071
Prioritization of data migration processes	-0.076	0.077	-0.029	0.266	0.141	-0.012
Communication and coordination of data migration project	0.171	0.156	-0.174	0.048	-0.107	-0.164
Setting up the necessary technical infrastructure and expertise	0.185	0.201	-0.129	-0.083	-0.18	0.043
Setting of equipment and components	0.071	-0.086	-0.052	0.358	-0.128	0.005
Planning on how to track records thought the process	0.07	0.098	-0.062	-0.045	0.269	-0.213
Setting data migration copy status and records management standards.	-0.091	-0.036	0.061	-0.004	0.417	0.122
Evaluating the physical condition of	-0.044	0.133	0.105	-0.04	0.083	0.224

records and readiness for migration						
Determination of the format to be used in workflow and system standardization	-0.135	0.047	0.347	-0.095	-0.008	0.112
Selection of documents for data migration	-0.129	-0.133	0.42	0.132	0.102	-0.314
Preparation for data migration. (Hardware , software environment)	0.034	-0.247	0.209	0.24	-0.07	-0.019
Moving original materials	-0.007	0.052	0.223	-0.205	0.022	0.054
Quality assurance and quality control of data	0.207	-0.093	-0.062	-0.001	0.099	0.054
Quality management, quality assurance and quality control of digital copies	0.194	-0.089	-0.053	-0.032	0.057	0.178
Technical verification of digital objects to technical standards	0.123	0.073	0.014	0.005	0.007	-0.076
Quality review of the migrated data	0.223	-0.042	-0.083	0.06	-0.022	-0.033
Linking the migrated data to all appropriate IT Systems	0.273	-0.001	-0.094	-0.095	-0.082	-0.077
Staff Training	-0.054	0.113	0.256	-0.034	-0.294	-0.002
Project assessment, evaluation and reporting	-0.011	0.033	-0.081	-0.036	-0.03	0.673

### **Factor Analysis (Component Matrix)**

The component matrix contains the relative Eigen values in respect of each factor. Each factor belongs to one of six set of factors extracted, and is determined by the Eigen values of the factors to each set. Each number represents the correlation between the item and the unrotated factor. The unrotated component matrix indicates the correlation of each practice with the extracted factors. The correlations help in interpreting the underlying factors.



#### 4.3.2.5 Rotated Component Matrix

Rotation component matrix is use to reduce the number factors on which the variables under investigation have high loadings. Rotation does not actually change anything but makes the interpretation of the analysis easier. The Rotated Component Matrix displays the loadings for each item on each rotated component, again clearly showing which items make up each component. Factors were rotated using varimax method. Varimax is undoubtedly the most popular rotation method by far. For varimax a simple solution means that each factor has a small number of large loadings and a large number of zero (or small) loadings.

This simplifies the interpretation because, after a varimax rotation, each original variable tends to be associated with one (or a small number) of factors, and each factor represents only a small number of variables. In addition, the factors can often be interpreted from the opposition of few variables with positive loadings to few variables with negative loadings. The rationale for rotating factors comes from the fact that this procedure simplifies the factor structure and therefore makes its interpretation easier and more reliable. Results are presented in Table 4.3.5

Table 4.3.5 presents the rotated component matrix. According to these criteria, a matrix of loadings (where the rows correspond to the original variables and the columns to the factors) is simplified.

**Table 4.3.5:Factor Analysis (Rotated Component Matrix)**

	Component					
	1	2	3	4	5	6
Specify the need for doing the data migration	0.029	0.674	0.091	-0.233	0.238	0.228

Planning, budgeting and monitoring	0.287	0.615	0.215	0.429	0.032	-0.28
Selection of data migration processes	0.639	0.224	0.306	-0.456	0.046	0.079
Assessment of data migration processes	0.514	0.541	0.089	-0.275	0.139	0.186
Prioritization of data migration processes	0.456	0.633	0.381	0.121	0.06	0.115
Communication and coordination of data migration project	0.451	0.389	0.134	-0.191	0.756	0.062
Setting up the necessary technical infrastructure and expertise	0.653	0.229	0.304	-0.153	0.311	0.191
Setting of equipment and components	0.541	0.469	-0.05	0.483	0.166	0.173
Planning on how to track records through the process	0.408	-0.055	0.443	-0.423	0.082	0.137
Setting data migration copy status and records management standards.	0.304	-0.263	0.762	-0.034	0.288	0.047
Evaluating the physical condition of records and readiness for migration	0.77	0.103	0.109	-0.002	0.221	0.23
Determination of the format to be used in workflow and system standardization	0.605	-0.159	0.259	-0.041	0.476	0.082
Selection of documents for data migration	0.576	-0.21	0.108	-0.066	0.455	0.483
Preparation for data migration. (Hardware , software environment)	0.469	-0.217	0.157	0.644	0.131	0.257
Moving original materials	0.55	-0.411	0.189	-0.212	0.253	0.111
Quality assurance and quality control of data	0.73	-0.439	0.226	0.094	0.185	0.022

Quality management, quality assurance and quality control of digital copies	0.724	-0.463	0.164	0.184	-	0.147
Technical verification of digital objects to technical standards	0.8	0.005	0.037	-0.129	-	0.101
Quality review of the migrated data	0.763	-0.162	0.015	0.081	-	0.279
Linking the migrated data to all appropriate IT Systems	0.636	-0.355	0.172	-0.121	-	-0.35
Staff Training	0.522	0.216	0.738	-0.024	-	0.206
Project assessment, evaluation and reporting	0.337	0.031	0.16	0.526	-	0.087

#### 4.3.2.6 Factor Isolation

This involved isolating each of the variables and grouping them by these six extracted factors.

Table 4.3.6 presents the factors

**Table 4.3.6: Isolation of factors**

Factor group	Practices
Factor 1	Technical verification of digital objects to technical standards Evaluating the physical condition of records and readiness for migration Quality review of the migrated data Quality assurance and quality control of data

	<p>Quality management, quality assurance and quality control of digital copies</p> <p>Selection of data migration processes</p> <p>Setting up the necessary technical infrastructure and expertise</p> <p>Linking the migrated data to all appropriate IT Systems</p> <p>Linking the migrated data to all appropriate IT Systems</p> <p>Moving original materials</p> <p>Staff Training</p> <p>Linking the migrated data to all appropriate IT Systems</p> <p>Setting of equipment and components</p> <p>Determination of the format to be used in workflow and system standardization</p> <p>Selection of documents for data migration</p>
Factor 2	<p>Specify the need for doing the data migration</p> <p>Planning, budgeting and monitoring</p> <p>Assessment of data migration processes</p> <p>Prioritization of data migration processes</p>
Factor 3	<p>Setting data migration copy status and records management standards.</p> <p>Planning on how to track records through the process</p>
Factor 4	<p>Preparation for data migration. (Hardware , software environment)</p>
Factor 5	<p>Communication and coordination of data migration project</p>

Factor 6	Project assessment, evaluation and reporting
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Table 4.3.6 presents the variables in the six factors extracted. Factor 1 included variables such as technical verification of digital objects to technical standards, evaluating the physical condition of records and readiness for migration, quality review of the migrated data, quality assurance and quality control of data, quality management, quality assurance and quality control of digital copies, selection of data migration processes, setting up the necessary technical infrastructure and expertise, linking the migrated data to all appropriate IT Systems, linking the migrated data to all appropriate IT Systems, moving original materials, staff Training, linking the migrated data to all appropriate IT Systems, Setting of equipment and components, determination of the format

Factor 2 contains practices such as Specify the need for doing the data migration, planning, budgeting and monitoring, assessment of data migration processes and prioritization of data migration processes. It can be called ‘Specify the need for doing the data migration’. Factor 3 contained setting data migration copy status and records management standards, and planning on how to track records thought the process. Factor 3 can be called “setting data migration copy status and records management standards”. Factor 4 consists of preparation for data migration. (Hardware, software environment). Factor 5 consists of determination of the format to be used in workflow and system standardization. Factor 6 consists of project assessment, evaluation and reporting.

#### **4.4 Factors Affecting Data Migration**

The study had an objective of determining the factors affecting data migration in the Kenya Government

#### 4.4.1 Descriptive Statistics for Factors in Data Migration

Respondents were required to indicate the extent to which each of the listed factors was applied in the data migration project in the department. The rating that was used was 1-No extent, 2-Small Extent, 3- Moderate extent, 4-Great Extent, 5-Very great extent. Responses were analyzed through mean scores. Mean scores were interpreted as follows: 1- 1.5 as No extent; 1.5 – 2.5 as Small Extent; 2.5 – 3.5 as Moderate extent; 3.5 – 4.5 as Great extent and above 4.5 as Very great extent. The standard deviation describes the distribution of the responses to mean. It provides an indication of how far individual responses to each factor vary from the mean. A standard deviation of more than one indicates a great variation in the response meaning respondents did not have a consensus on their views, while a standard deviation of less than 1 indicates less variation in the responses. The results from the analysis are presented in Table 4.4.1

**Table 4.4.1: Factors Affecting Data Migration**

<b>Factors</b>	<b>Mean Score</b>	<b>Std Deviation</b>
Policy enactment before data migration start	2.63	1.189
Planning monitoring and effective budgeting	3.17	.950
Acquisition of proper technology in time	3.43	1.135
Distribution of data for migration	3.13	.973
Support from storage vendors	3.10	1.269
Data migration being part of a larger chain of dependencies	3.30	.915
Data requirement clearly defined	3.43	.935
Sensitization, psychological preparation and training of staff	3.30	1.317
Collaboration with other departments and stakeholders	3.00	1.017
User orientation	3.27	1.112
Availability of staff in the project	3.30	1.119
Availability of funding	4.23	5.393

Training project staff and public servants	3.13	1.042
Continuity of migrating data	3.03	1.033
Consulting successful Government departments or experts	3.07	1.172
Management support	3.33	.884
Availability of data migration quality standard	3.37	.850
Efficient procurement procedure for project resources	3.30	1.088
Effective procurement procedure for project resources	3.50	.974
Trial Testing	3.33	1.028

**Source: Researcher, 2015**

Study results presented in Table 4.4.1 reveal that factors affecting data migration to great extent is effective procurement procedure for project resources (3.50). More factors affecting data migration to moderate extent includes data requirement clearly defined (3.43) and Acquisition of proper technology in time (3.43), Trial Testing (3.33), and many more. Most factors affected data migration moderately.

#### **4.4.2 Factor Analysis on Factors**

Responses on factors were further subjected to factor analysis to establish the main factors in the practices in data migration projects.

##### **4.4.2.1 Communalities**

Communality is the proportion of variance that each item has in common with other items. The proportion of variance that is unique to each item is then the respective item's total variance minus the communality. Table 4.4.2 of communalities shows how much of the variance in the

variables has been accounted for by the extracted factors. Commuality matrix was extracted from the factor analysis where Table 4.4.2 shows the communalities.

**Table 4.4.2 Factor Analysis (Communalities)**

<b>Factors affecting Data Migration</b>	<b>Initial</b>	<b>Extraction</b>
Specify the need for doing the data migration	1.000	.748
Planning, budgeting and monitoring	1.000	.946
Selection of data migration processes	1.000	.820
Assessment of data migration processes	1.000	.832
Prioritization of data migration processes	1.000	.784
Communication and coordination of data migration project	1.000	.732
Setting up the necessary technical infrastructure and expertise	1.000	.791
Setting of equipment and components	1.000	.844
Planning on how to track records thought the process	1.000	.766
Setting data migration copy status and records management standards.	1.000	.797
Evaluating the physical condition of records and readiness for migration	1.000	.781
Determination of the format to be used in workflow and system standardization	1.000	.868
Selection of documents for data migration	1.000	.774
Preparation for data migration. (Hardware , software environment)	1.000	.764
Moving original materials	1.000	.890
Quality assurance and quality control of data	1.000	.802
Quality management, quality assurance and quality control of digital copies	1.000	.708
Technical verification of digital objects to technical standards	1.000	.815
Quality review of the migrated data	1.000	.754



Linking the migrated data to all appropriate IT Systems	1.000	.863
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**Source: Researcher, 2015**

Results presented in Table 4.4.2 on communalities reveal how much of the variance in each of the original variables is explained by the extracted factors. Higher communalities are desirable. If communality for a variable is less than 50%, it is a candidate for exclusion from the analysis because the factor solution contains less than half of the variance in the original variable, and explanatory power of that variable might be better represented by the individual variable.

#### 4.4.2.2 Factor Extraction

This section shows all the factors extractable from the analysis along with their eigenvalues, the percent of variance attributable to each factor, and the cumulative variance of the factor and the previous factors. Factors were extracted using principal factor analysis with 7 factors being extracted as indicated in Table 4.4.3

**Table 4.4.3: Factor Extraction ( Total Variance Explained )**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumul%	Total	% of Variance	Cumul %	Total	% of Variance	Cumul %
1	7.355	36.774	36.774	7.355	36.774	36.774	4.327	21.637	21.637
2	2.234	11.168	47.942	2.234	11.168	47.942	3.514	17.572	39.208
3	1.796	8.981	56.922	1.796	8.981	56.922	2.308	11.538	50.746
4	1.464	7.321	64.243	1.464	7.321	64.243	2.149	10.743	61.489
5	1.164	5.822	70.065	1.164	5.822	70.065	1.375	6.875	68.364
6	1.059	5.297	75.363	1.059	5.297	75.363	1.205	6.026	74.39
7	1.008	5.038	80.401	1.008	5.038	80.401	1.202	6.011	80.401
8	0.752	3.76	84.161						
9	0.605	3.027	87.188						

10	0.58	2.901	90.089					
11	0.488	2.441	92.53					
12	0.387	1.936	94.467					
13	0.252	1.26	95.727					
14	0.218	1.091	96.818					
15	0.205	1.025	97.844					
16	0.168	0.838	98.682					
17	0.137	0.687	99.368					
18	0.072	0.358	99.726					
19	0.042	0.211	99.937					
20	0.013	0.063	100					

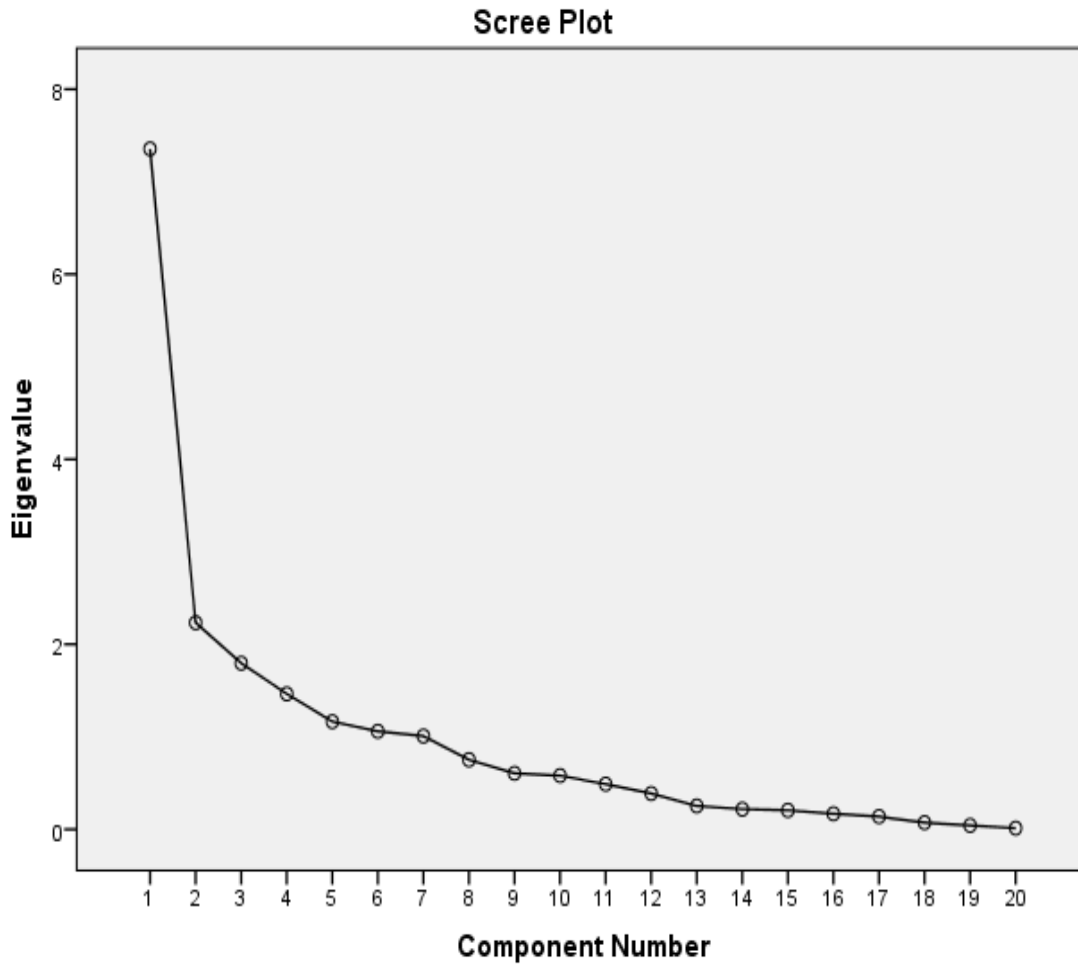
**Source: Researcher, 2015**

The Table presents total variance of all the factors. Principal component analysis was used to extract factors which totaled to 20. Eigen values indicate the relative importance of each factor accounting for a particular set and hence those with small Eigen value were left out. According to Table 4.4.3, only seven factors were significant for the analysis.

From Table 4.4.3 we notice that the first factor accounts for 36.774% of the variance, the second 11.168% of the variance, the third 8.981% of the variance, the fourth 7.321% of the variance, the fifth 5.822% of the variance, the sixth 5.297% of the variance and the seventh 5.038% of the total variance. All the remaining factors are not significant.

#### **4.4.2.3 Scree Plot**

A scree plot which is a plot of the factor Eigen values against the component number. The scree plot in Figure 4.3.1 shows the factors that were extracted by indicting an elbow in the graph. In this case, 7 factors were extracted.



**Figure 4.4.2: Scree Plot**

The scree plot is a plot of factor Eigen values against the components number. According to figure 4.4.2, we only consider 7 factors because the curve tends to flatten from the Seventh

#### **4.4.2.4 Component Matrix**

The Table below shows the loadings of the thirty variables on the six factors extracted. The higher the absolute value of the loading, the more the factor contributes to the variable. A component matrix containing the Eigen values in respect to each factor was extracted from the factor analysis. The results are presented in Table 4.4.4

**Table 4.4.4:Factor Analysis (Component Score Coefficient Matrix)**

	Component						
	1	2	3	4	5	6	7
Specify the need for doing the data migration	.024	-.116	-.109	.416	.029	.092	.195
Planning, budgeting and monitoring	-.004	.002	-.009	-.054	.040	-.020	.817
Selection of data migration processes	-.112	.140	.108	.152	-.248	.171	-.053
Assessment of data migration processes	-.128	.009	.050	.438	.082	-.090	-.206
Prioritization of data migration processes	-.017	.098	-.059	.004	.090	.577	.001
Communication and coordination of data migration project	.018	-.146	.366	.041	-.103	.141	.039
Setting up the necessary technical infrastructure and expertise	-.038	-.070	.378	-.007	.179	-.095	-.076
Setting of equipment and components	.264	-.177	-.070	.088	-.128	.192	-.126
Planning on how to track records through the process	.261	-.027	-.044	-.165	.061	-.084	.055
Setting data migration copy status and records management standards.	.270	-.192	.106	-.025	-.012	.036	.045
Evaluating the physical condition of records and readiness for migration	.160	-.014	.203	-.165	-.090	-.037	-.149
Determination of the format to be used in workflow and system standardization	-.014	.006	-.007	.017	.659	.013	.016
Selection of documents for data migration	.134	.047	-.174	.076	.358	.030	.123
Preparation for data migration. (Hardware , software environment)	.180	-.087	-.068	.210	-.040	-.182	-.010
Moving original materials	.132	.154	-.083	-.085	.009	-.289	.075
Quality assurance and quality control of data	-.165	.364	-.223	.157	.163	.001	-.164
Quality management, quality assurance and quality control of digital copies	.075	.080	-.054	.115	.040	-.446	-.008
Technical verification of digital objects to technical standards	-.070	.317	.037	-.200	.029	.098	.104
Quality review of the migrated data	-.055	.207	.009	-.003	-.181	.249	-.026
Linking the migrated data to all appropriate IT Systems	-.073	.187	.342	-.227	-.085	-.157	.127

The component matrix contains the relative Eigen values in respect of each

factor. Each factor belongs to one of seven set of factors extracted, and is determined by the Eigen values of the factors to each set. Each number represents the correlation between the item and the unrotated factor. The unrotated component matrix indicates the correlation of each practice with the extracted factors. The correlations help in interpreting the underlying factors.

#### 4.4.2.5 Rotated Component Matrix

Rotation component matrix is use to reduce the number factors on which the variables under investigation have high loadings. Rotation does not actually change anything but makes the presented in Table 4.4.5

**Table 4.4.5: Factor Analysis (Rotated Component Matrix)**

	Component						
	1	2	3	4	5	6	7
Setting of equipment and components	.827			.199	-.144	.280	-.133
Setting data migration copy status and records management standards.	.816		.302	.133		.130	
Planning on how to track records thought the process	.815	.275		-.141			
Evaluating the physical condition of records and readiness for migration	.671	.337	.417				-.196
Preparation for data migration. (Hardware , software environment)	.657	.242		.478	-.108	-.166	
Moving original materials	.642	.624				-.280	
Selection of documents for data migration	.621	.376		.206	.419	.127	.112
Quality assurance and quality control of data		.806	-.137	.295	.127		-.156
Technical verification of digital objects to technical standards	.303	.799	.201			.151	.103
Quality review of the migrated data	.344	.661	.153	.193	-.227	.294	
Selection of data migration processes	.174	.554	.358	.475	-.308	.179	
Setting up the necessary technical infrastructure and expertise			.789	.155	.365		
Communication and coordination of data migration project	.199		.743	.302		.194	.104
Linking the migrated data to all appropriate IT Systems	.153	.579	.675			-.153	.154

Assessment of data migration processes		.213	.368	.782		-.120	-.116
Specify the need for doing the data migration	.203			.759		.113	.334
Determination of the format to be used in workflow and system standardization			.200		.901		
Prioritization of data migration processes	.339	.353			.173	.711	
Quality management, quality assurance and quality control of digital copies	.399	.437		.334		-.488	
Planning, budgeting and monitoring				.123			.959

**Source: Researcher,2015**

Table 4.4.5 presents the rotated component matrix. The rationale for rotating factors comes from the fact that this procedure simplifies the factor structure and therefore makes its interpretation easier and more reliable. According to these criteria, a matrix of loadings (where the rows correspond to the original variables and the columns to the factors) is simplified. Varimax is undoubtedly the most popular rotation method by far. For varimax a simple solution means that each factor has a small number of large loadings and a large number of zero (or small) loadings. This simplifies the interpretation because, after a varimax rotation, each original variable tends to be associated with one (or a small number) of factors, and each factor represents only a small number of variables. In addition, the factors can often be interpreted from the opposition of few variables with positive loadings to few variables with negative loadings.

#### **4.4.2.6 Factor Isolation**

This involved isolating each of the variables and grouping them by these 7 extracted factors. Table 4.4.6 presents the factors.

**Table 4.5.6: Isolation of factors**

Factor group	Factors affecting Data Migration
Factor 1	<ul style="list-style-type: none"><li>• Setting of equipment and components</li><li>• Setting data migration copy status and records management standards.</li><li>• Planning on how to track records thought the process</li><li>• Evaluating the physical condition of records and readiness for migration</li><li>• Preparation for data migration. (Hardware , software environment)</li><li>• Moving original materials</li><li>• Selection of documents for data migration</li></ul>
Factor 2	<ul style="list-style-type: none"><li>• Quality assurance and quality control of data</li><li>• Technical verification of digital objects to technical standards</li><li>• Quality review of the migrated data</li><li>• Selection of data migration processes</li></ul>
Factor 3	<ul style="list-style-type: none"><li>• Setting up the necessary technical infrastructure and expertise</li><li>• Communication and coordination of data migration project</li><li>• Linking the migrated data to all appropriate IT Systems</li></ul>
Factor 4	<ul style="list-style-type: none"><li>• Specify the need for doing the data migration</li><li>• Assessment of data migration processes</li></ul>
Factor 5	<ul style="list-style-type: none"><li>• Determination of the format to be used in workflow and system standardization</li></ul>
Factor 6	<ul style="list-style-type: none"><li>• Prioritization of data migration processes</li></ul>
Factor 7	<ul style="list-style-type: none"><li>• Planning, budgeting and monitoring</li></ul>

There were seven extracted factors to the group the factors affecting data migration. Factor 1 included setting of equipment and components, setting data migration copy status and records management standards, planning on how to track records thought the process, evaluating the physical condition of records and readiness for migration, preparation for data migration. (Hardware, software environment), moving original materials and selection of documents for

data migration. The first factor can be called “Setting of equipment and components”. Factor 2 included quality assurance and quality control of data, technical verification of digital objects to technical standards, quality review of the migrated data and selection of data migration processes. Factor 2 can be called “Quality assurance and quality control of data”.

Factor 3 included Setting up the necessary technical infrastructure and expertise, communication and coordination of data migration project, linking the migrated data to all appropriate IT Systems. Factor 3 can be called “Setting up the necessary technical infrastructure and expertise”.

Factor 4 contained specifying the need for doing the data migration and assessment of data migration processes. Factor 4 can be called “assessment of data migration processes”. Factor 5 consisted of determination of the format to be used in workflow and system standardization, factor 6 consisted of prioritization of data migration processes and lastly factor 7 consisted of planning, budgeting and monitoring.

#### **4.5 Discussion of the Findings**

This section provides study findings of the objectives of the study. The study established six data migration practices in the Kenya Government ministries. The major practices being technical verification of digital objects to technical standards and specifying the need for doing the data migration. While there were many practices this two came out strongly as major practices. Thus bringing a difference from what is known and what the study revealed.

The study also had an objective of determining the factors affecting data migration in the Kenya Government. And it identified seven factors. Major ones being setting of equipment and components, quality assurance and quality control of data and setting up the necessary technical infrastructure and expertise. The rest of the factors were fairly distributed and thus most of the



known factors from the study and before the study being factors that are still affecting data migration projects.

## **CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS**

### **5.1 Introduction**

This Section provides the summary of findings, conclusions and recommendations that are made in the study after considering the study findings. The objective of the study was to establish the practices and factors affecting data migration projects in the Kenyan Government.

### **5.2 Summary Findings**

Study results indicate that some of the studied data migration projects were funded wholly by the departments; others were funded from external sources while the rest were jointly funded by the department and grant awarding agencies. Regarding the time the data migration projects started, results revealed that the earliest data migration projects started in 2011 while the latest started in 2015.

Results regarding stage of completion of the data migration projects revealed that most of the data migration projects were fully completed while a few being less than 25% completed. Regarding the personnel that were undertaking the data migration project, results reveal that

most of the data migration projects were undertaken by the IT departmental staff. A few of the projects were undertaken by both the consultants and the IT department. Study findings establish that most of the migrated materials were texts and a few being Images.

The study had an objective to establish the practices involved in data migration projects undertaken by the departments in the Kenyan Government. Study results indicated that practices that were followed to a great extent in the data migration projects included specifying the need for doing the data migration, Planning, budgeting and monitoring, Communication and coordination of data migration project, setting up the necessary technical infrastructure and expertise, Quality management, quality assurance and quality control of digital copies. Factor analysis established six major practices that need to be observed. These include technical verification of digital objects to technical standards, specifying the need for doing the data migration, setting data migration copy status and records management standards, project assessment evaluation and reporting, Communication and coordination of data migration project and lastly project assessment, evaluation and reporting.

Regarding factors affecting data migration in Kenyan Government, Study revealed that the factor that affected data migration to a great extent was determination of the format to be used in workflow and system standardization. Other factors affecting data migration to a moderate extent included selection of data migration processes, quality review of the migrated data, setting up the necessary technical infrastructure and expertise, quality management, quality assurance and quality control of digital copies, evaluating the physical condition of records and readiness for migration and technical verification of digital objects to technical standards. Most Factors affected data migration in a moderate extent. Results from factor analysis indicate that seven factors were established from the responses. The first factor was, setting of equipment and components, second was quality assurance and quality control of data. The third one was

setting up the necessary technical infrastructure and expertise. Fourth one was assessment of data migration processes, Fifth is determining of the format to be used, sixth prioritization of data migration processes and lastly planning budgeting and monitoring.

### **5.3 Conclusions**

From the study findings, the following conclusions are made. First, data migration is happening in most of the Kenyan Government ministries. Data migration follows some of the best practices in data migration including quality assurance and quality control of metadata, content preservation, specifying the need for doing data migration. However, there are some important practices that are not involved to a great extent in the data migration project in government which may compromise the success of the projects. These include project assessment, evaluation and reporting and evaluation of physical condition of records and readiness for migration.

Lastly, the study concludes that planning, budgeting and monitoring, Determination of the format to be used in workflow and system standardization, Assessment of data migration processes, setting up the necessary technical infrastructure and expertise and Quality assurance and quality control of data are the critical factors affecting data migration project in the government of Kenya.

### **5.4 Recommendations of the Study**

From the study findings the following recommendations are made regarding data migration in the Kenyan Government. First, the government department should ensure that proper planning and budgeting is done even before the project starts. Successful projects should include careful

planning before implementing a data migration initiative. This planning should consider how data migration fits into government overall vision, technology plan, and project workflows. Departments that are planning to have data migration projects should be encouraged to ensure that enough resources, funding and personnel are procured for the project during the planning phase.

### **5.5 Limitations of the Study**

The study faced challenges of timely responses from the participants. Most respondents required a lot of persistence and reminding from the researcher to respond to the questionnaires. There were also cases of some respondents misplacing the questionnaires forms which necessitated the researcher to provide them with replacement copies of the questionnaire. However, the researcher was able to cope with this limitation by communicating with potential respondents and offering the motivation required to respond to the questionnaires.

The study also could have been faced with the possibility of bias in the responses since it focused on senior project officers in the data migration projects. This may have been due to the need to make the implementation of the project to look good. However, the researcher expressly indicated to the respondents that objectivity of the responses was important and there was need to respond truthfully. Respondents were informed that the findings could be used as a basis for making improvements in future data migration projects.

### **5.6 Suggestions for Future Research**

This study established the practices involved in the data migration projects undertaken by departments in the Kenyan Government. The study further determined the factors affecting data migration projects in the Kenyan Government. This study was a survey of government departments that are in the process of migrating their data or have migrated their data. For future

research in this area, a case study approach may be adopted where in depth data on the practices and factors can be sought. This study could apply on an interview method of data collection to develop deeper in the data migration projects taking place in government.

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## **APPENDIXES**

### **Appendix I: Questionnaire to data migration Project Leaders in Government Departments**

This questionnaire is aimed at collecting data regarding practices, challenges and factors affecting data migration project. Your organization has been selected to participate in this survey.

Please give response to all the questions by filling or ticking in the appropriate spaces in the questionnaire.

#### **SECTION A: GENERAL INFORMATION**

1. What is your gender?

Male..... [ ]

Female ..... [ ]

2. What is your age bracket in years

18-25..... [ ]

26-30..... [ ]

31-35..... [ ]

36-40..... [ ]

41-45..... [ ]

46-50..... [ ]

Above 50..... [ ]

3. What is your job title in the organization? \_\_\_\_\_

4. How many years have you worked in this department? \_\_\_\_\_years.

5. When did data migration start in your organization? \_\_\_\_\_

6. How was the data migration project funded?

Department ..... [ ]

External Sources..... [ ]

Grant awarding agencies..... [ ]

Other specify\_\_\_\_\_

\_\_\_\_\_

7. At what state of completion is data migration in your organization?

Less than 25%..... [ ]

25% complete..... [ ]

50% complete..... [ ]

75% complete..... [ ]

100% complete..... [ ]

8. Who is undertaking data migration project?

IT department staff ..... [ ]

Vendor / Consultant ..... [ ]

Others, specify\_\_\_\_\_

\_\_\_\_\_

9. Indicate the type of data being migrated?

Images..... [ ]

Texts..... [ ]

Numbers..... [ ]

Others, specify \_\_\_\_\_  
\_\_\_\_\_

## **SECTION B: PRACTICES IN THE DATA MIGRATION**

1. Indicate the extent to which each of the following practices applies in the data migration project in your department. Use the following rating: Tick appropriately.

1-No extent

2-Small Extent

3- Moderate extent

4-Great Extent

5-Very great extent

	<b>Practices</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1.	Specify the need for doing the data migration					
2.	Planning, budgeting and monitoring					
3	Selection of data migration processes					
4.	Assessment of data migration processes					
5.	Prioritization of data migration processes					
6.	Communication and coordination of data migration project					
7.	Setting up the necessary technical infrastructure and expertise					
8.	Setting of equipment and components					
9.	Planning on how to track records through the process					
10.	Setting data migration copy status and records management standards.					

11.	Evaluating the physical condition of records and readiness for migration					
12.	Determination of the format to be used in workflow and system standardization					
13.	Selection of documents for data migration					
14.	Preparation for data migration. (Hardware , software environment)					
15.	Moving original materials					
16.	Quality assurance and quality control of data					
17.	Quality management, quality assurance and quality control of digital copies					
18.	Technical verification of digital objects to technical standards					
19.	Quality review of the migrated data					
20.	Linking the migrated data to all appropriate IT Systems					
21.	Staff Training					
22.	Project assessment, evaluation and reporting					
23.	Other ( specify and rate accordingly )					

**SECTION C: FACTORS AFFECTING DATA MIGRATION PROJECT**

1. Indicate the extent to which each of the following Factors have affected data migration project in your department. Use the following rating: Tick appropriately.

1-No extent

2-Small Extent

3- Moderate extent

4-Great Extent

5-Very great extent

	<b>Factors</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1.	Policy enactment before data migration start					
2.	Planning monitoring and effective budgeting					
3.	Acquisition of proper technology in time					
4.	Distribution of data for migration					
5.	Support from storage vendors					
6.	Data migration being part of a larger chain of dependencies					
7.	Data requirement clearly defined					
8.	Sensitization, psychological preparation and training of staff					
9.	Collaboration with other departments and stakeholders					
10.	User orientation					
11.	Availability of staff in the project					
12.	Availability of funding					
13.	Training project staff and public servants					
14.	Continuity of migrating data					
15.	Consulting successful Government departments or experts					
16.	Management support					
17.	Availability of data migration quality standard					
18.	Efficient procurement procedure for project resources					
19.	Effective procurement procedure for project resources					
20.	Trial Testing					
	Other ( Specify and rate accordingly )					

## **Appendix 2: List of Ministries and departments in Kenya**

### 1. Ministry of Interior and Coordination of National Government.

- i. Immigration
- ii. National Registration Bureau
- iii. Civil Registration
- iv. Refugee Affairs
- v. Population Registration Services

### 2. Ministry of Devolution and Planning

- i. Macro planning
- ii. Monitoring and Evaluation

- iii. Rural Planning
- iv. Sectoral Planning
- v. Specializes Units

### 3. Defence

- i. Army
- ii. Airforce
- iii. Navy

### 4. Foreign Affairs

- i. Foreign Relations
- ii. Trade and economic relations
- iii. Treaties and international law

### 5. Education

- i. Basic education
- ii. Secondary education
- iii. Adult and continuing Education
- iv. Quality Assurance and standards
- v. Policy, Partnership and EAC
- vi. Field services
- vii. Science and technology

### 6. The National Treasury.

- i. Public procurement
- ii. Budgetary suppliers
- iii. External resources
- iv. Accountant general
- v. Pensions



- vi. Economic affairs
- vii. Debt management
- viii. Government investment
- ix. Government clearance

## 7. Health

- i. Family Health services
- ii. Disease Control
- iii. Radiation Protection
- iv. Primary Healthcare services
- v. Environmental Health and sanitation
- vi. Health Promotion
- vii. Technical Planning and Performance
- viii. Monitoring
- ix. Disaster management and preparedness
- x. International Health relations

## 8. Transport and Infrastructure

- i. Transport Services
- ii. Infrastructure

## 9. Environment, Water and Natural Resource

- i. Environment
- ii. Resource Surveys and Remote Sensing
- iii. Meteorology
- iv. Water and Natural Resources

## 10. Land, Housing and Urban Development

- i. Lands

- ii. Lands adjudication and settlement
  - iii. Surveys
  - iv. Physical planning
  - v. Housing
  - vi. Urban Development
11. Information, Communication and Technology (ICT)
- i. Licensing
  - ii. Communications
  - iii. Information technology
12. Sports, Culture and the Arts
- i. Sports
  - ii. Culture and heritage
  - iii. Arts
13. Labour, Social Security and Services
- i. Labour
  - ii. Social Security
14. Agriculture, Livestock and Fisheries
- i. Agriculture
  - ii. Livestock
  - iii. Fisheries
15. Industrialization and Enterprise Development
- i. Industrialization
  - ii. Enterprise development
16. Commerce and Tourism
- i. Commerce

- ii. Tourism

## 17. Mining

- i. Geology
- ii. Exploration
- iii. Mineral management

## 18. Energy and Petroleum

- i. Petroleum energy
- ii. Renewable energy
- iii. Electrical Power development
- iv. Geo- exploration