

**PROCESS AND CHALLENGES OF DIGITIZATION: A CASE
STUDY OF ROAD TRANSPORT DEPARTMENT, KENYA
REVENUE AUTHORITY**

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**A Research Project Submitted in Partial Fulfillment of the
Requirements of Degree of Master of Business Administration,
School of Business,
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NOVEMBER, 2011

DECLARATION

This research project is my original work and has not been presented for examination to any other university.

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This research project has been submitted for examination with my approval as the University Supervisor

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ACKNOWLEDGMENTS

My profound thanks to my mother, who has been a pillar of strength and encouragement. I would like to express my immense gratitude to my sister Christine and my three friends Kirathe, Kamiri, and Pauline for the luxury of your encouragement and support throughout the time it took to complete this work. God bless you.

This research would not have been written without the generous assistance of my research supervisor, Joel Lelei of the University of Nairobi, school of Business who shared his knowledge and expertise and steered me in the right direction. My deep appreciation for his guidance. It would be wrong to forget Dr Njihia, Mwangi and Ombati all of Department of Management Science for your insight and support. Thank you

To the respondents at Kenya Revenue Authority (KRA), Road Transport Department for the time you took to aid me in data collection and the Senior Deputy Commissioner Human Resources for approving my request to collect data.

To my siblings; Dave, Beth and Steve for being there and encouraging me in my pursuit, I thank you and wish you well in your studies.

DEDICATION

This project is dedicated to my daughter Swafia Wanjiku for whom I strive to do better.

LIST OF ABBREVIATIONS

| | |
|-------|---------------------------------------|
| KRA | Kenya Revenue Authority |
| RTD | Road Transport Department |
| CSD | Customs Services Department |
| DTD | Domestic Taxes Department |
| I&E | Investigations and Enforcement |
| AKI | Association of Kenya Insurers |
| VAT | Value Added Tax |
| ICT | Information Co |
| VMS | Vehicle Management Information System |
| KOVIS | KoFile Visual Information System |
| RGB | Red, Green and Blue |
| CMYK | Cyan, Magenta, Yellow and Black |

ABSTRACT

Digitization is the process of converting records from paper form to electronic form. In the context of Kenya Revenue Authority's Road Transport Department, a focus is placed on e-government. This study has three objectives namely; to establish activities involved in digitization, to determine the rationale behind activities of digitization and to determine challenges facing digitization. It contributes to how digitization can be used by the government in enhancing access to information and services in the Road Transport Department. It is trying to understand why organizations are opting to manage their information in electronic form by even going further to convert their earlier paper records into electronic ones

The study is qualitative and thus demanded collection of information to describe the qualities of what it was exploring. The sampling strategy that was used for this research is purposive/convenience sampling. The sample was conveniently picked to include those well versed with the operations in the various sections of the department and a total of fifteen respondents were picked. .

The findings reveal the various activities digitization that include scanning of documents like logbooks as well as having information available electronically as opposed to paper records. Benefits accruing from digitization that include less storage space, ease of access and speedy service delivery are also highlighted. Digitization therefore is a critical effort that must be expended in our businesses to effectively and efficiently manage records, despite the challenges of resistance to change and the ever competing needs of what to digitize and how best to do it..

The study therefore observes the benefits accruing from digitization and the need to embrace digitization as an efficient and effective method of records management.

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CHAPTER ONE: INTRODUCTION

1.1 Background

Modern organizations all over the world regard information as the fifth factor of production after labor (human capital), capital, financial base, land and entrepreneurship. The concept of global village has come up due to Information Technology (IT) and its swift evolution has made the world a mere community where one's location at any given is irrelevant in terms of information access and communication (Jones, 2007).

Garmin (2006) observes that in organizations, information plays a vital roles starting from the conception of a business, its establishment and continuity. Every organization is scanning both the existing and potential markets and customers, studying about their competitors to an extent of espionage, planning for future survival and creating information thereof. It is this information upon which many critical decisions are made, evaluated and implemented. Thus any erroneously created information will lead to collapse of the organization at a later stage.

Further, different organs and departments of governments produce enormous amount of information in their daily activities. The policies and decisions by these governments on matters of governance, accountability and development depend on how this information is accessed and utilized. Information gathered through business activities and transactions by a government provide intelligence base which when analyzed and manipulated produces knowledge.

Knowledge maintained in paper and other materials apart from electronic file are faced by the limitation of rigidity as far as sharing and remote access is concerned. They are not easily accessible by a majority due to centralization and bureaucracy. However, in efforts by the governments to show commitment in good governance and

accountability, digitization is proving to be a delimitation factor in what has been largely seen as inefficiency and ineffectiveness of paper records as media of information (Lesley, 2000). In efforts to enhance full access, sharing and usage of information held by the government and its people. Digitization is a complex combination of multi-channel process thinking, cross-enterprise integration, and business technology. This thinking increasingly shapes enterprise application innovation (Morris 2003). Process transformation has three interrelated dimensions:

Copyright is posing a challenge on digitization. As a the legal right of creative artists or publishers and authors to control the use and reproduction of their original works, mutual relations must be established between the author and the government or any other organization prior to converting any information from one format to another. In short legal aspects of information must be upheld as ethical issues regarding information management.

Copyright laws may continue to be sidelined by the growth of a highly accessible and usable public domain, an immense corpus of implicitly and explicitly licensed materials on the Web, and the fact that corporate and individual copyright owners are beginning to depend less on controlling and counting and selling digital copies. As these trends grow, it appears that copyright law may in some respects be simply getting out of the way. If it doesn't, it is going to be sidestepped (Harper, 2008).

The Google Book Search program aims to digitize the full text of books—both public domain and in copyright. The outcome will be a comprehensive, searchable index of a large body of published books in several languages. As of December 2007, twenty eight (28) libraries were participating in the Google project, with the goal of scanning all or part of their collections and making those texts searchable online. Google is also collaborating with more than 10,000 publishers around the world in addition to its

library partners. Google's business model is based on attracting as many users as possible to its site by offering a far-reaching search engine (Reiger, 2008).

According to Reiger (2008), in 2006, a group of publishers and authors filed suit against Google, claiming that it is digitizing books without permission in order to use the information for the company's benefit. Google argues that only a limited amount of information—in the form of snippets—is displayed for materials in copyright or whose copyright status is unknown, and that this feature encourages users to obtain the book from other sources, such as bookstores and libraries. A reading of relevant publicly available documents reveals that Google's position varies on allowing participating libraries to share the digital copies of their public domain holdings with academic institutions for non-commercial purposes.

Fair-use principle must be incorporated in every digitization project that intends to convert literature which is still under copyright protection as a show of respect, recognition and appreciation for intellect value of authors and writers and publishers commitment to document knowledge. Decision on how much is fair-use can be mutually agreed through consultations between stakeholders in information management such as authors, publishers and those digitizing documents (Nadler, 2004). Records Management (RM) and digitization are inseparable. A record must be managed according to the principles of Records Management for it to be relevant. Otherwise, once converted from one format to another, records would cease to be records. It is therefore imperative to understand Records Management when dealing with digitization in order to ensure that records will still satisfy standards recommended for them to be so records (Githaka, 2006).As such, the study broadly seeks to establish the function of digitization, the reasons why it is an important

function and the challenges it faces in the Road Transport Department of the Kenya Revenue Authority.

1.2 Kenya Revenue Authority

The concern of this study is records management in relation to digitization as a basis for helping an organization create, retain and use information and knowledge it considers vital for its operations and survival. This is done in the context of Kenya Revenue Authority, Road Transport Department.

The Kenya Revenue Authority was established by an Act of Parliament on July 1st 1995 Cap. 469 for the purpose of enhancing the mobilization of Government revenue, while providing effective tax administration and sustainability in revenue collection.

The Board and Management of Kenya Revenue Authority have since its inception spent time and resources setting up systems, procedures and the adoption of new strategies aimed at enhancing the operational efficiency of the Authority's processes.

In particular, the functions of the Authority are; to assess, collect and account for all revenues in accordance with the written laws and the specified provisions of the written laws, to advise on matters relating to the administration of, and collection of revenue under the written laws or the specified provisions of the written laws, to perform such other functions in relation to revenue as the Minister for Finance may direct.

The Various departments include, Customs Services Department (CSD), Domestic Taxes Department (DTD), Investigation and Enforcement (I&E) and Road Transport Department (RTD)

The Road Transport Department (RTD) was established under the Ministry of Transport and Communication in 1958 with the primary responsibility of regulating the transport sector and it is the administrator for all road transport matters in the

country. It plays an important role in ensuring that only those who are licensed and meet all requirements as stipulated in the Traffic Act use the road transport system.

Administratively, the department falls under KRA and all revenues realized form a part of the Authority's revenue collection. The transport ministry shares the responsibility of policy issues.

RTD also works closely with other players in the economy for example the Association of Kenya Insurers (AKI) and also provides critical information to other departments within the Authority. It ensures that any application seeking motor vehicle registration has paid all duties and gained customs clearance. It also provides data to Domestic Taxes Department (DTD) on individuals selling more than four motor vehicles per year for VAT registration purposes and also provides information about vehicle ownership for assessment of business income from the transport sector.

Reforms and modernization which encompasses digitization of the transport department will contribute significantly to how duties and responsibilities are discharged while ensuring that taxpayers and stakeholders get quality services delivered in the most effective manner. Road transport department has the following sections;

Registration Section, Transfer Section, Log Book Section, Registry and Driving License Section There also is a support function for Finance where monies are received. Road Transport Department generates enormous paper work in registration process of vehicles, driving licenses and log book processing and in their registry. Digitization can be of great importance in automation of these processes and even making the whole process of clearance and documentation easy and cheap. Just like the way citizens are able to remit their taxes, digitization can enable people access and transact online in matters dealing with road transport.

1.3 Research Problem

The need for digitization is apparent when in the view of the need to reduce paper work. Digitization which is the process of changing records from one format to another is very involving but the benefits greatly override the challenges. Garmin (2006) defines digitization as the process of converting, creating, and maintaining books, art works, historical documents, photos, journals, etc., in electronic representation so they can be viewed via computer and other devices.

The study endeavors to explore the concept of digitization as used in organizations to facilitate convenience on information access, workflow and reduce on the cost of managing information since managing records in electronic form is easier than maintaining them in paper form. It also examines the various technologies applied in digitization and their standards as required by Records Management practices, opportunities and challenges.

Since the arrival of IT, world has changed significantly be it in learning and research, business transactions, communication, military intelligence just to mention a few. What IT has done revolves around a single entity: information. It has brought about *en masse* information generation, sharing, transmission-cum-communication and preservation. Through digitization, an organization can reduce the cost of its information management, improve access to data and information and minimize on its need for space as demanded by paper records management.

Digitization also opens up new methods of doing business and face lifts the business image. It furthermore seeks to bridge the gap that exists between paper and electronic records mainly through converting paper records into the latter.

1.4 Objectives of the Study

The study is an investigation of the process and challenges of digitization: a case study of road transport department, Kenya revenue authority and the specific objectives are;

- a) To establish activities involved in digitization at KRA's Road Transport Department.
- b) To determine the rationale behind activities of digitization in the Road Transport Department.
- c) To determine challenges facing digitization in the road transport department.

1.5 Importance of the Study

Considering Kamar (2007) argument on importance of e-government in enabling utilization of information by the public through ICT infrastructures, this study elaborates on how digitization can be used by the government in enhancing access to information and services in the Road Transport Department. This will be helpful to the policy makers at the revenue authority in line to informing the possibility and challenges of digitization. The human resources department of KRA will also be versed about key competencies for staff in digitization efforts.

Government through its departments will be able to sell its policies to the public and other stakeholders through digitization, through enhanced access to information, public will be able to hold its elected leadership accountable for their actions, business community will also be able to transact with ease with the government.

Further, this study will be used by other players in the industry who generate a lot of paper records to enable them digitize for example libraries, schools to mention a few. This will help in informing their decision to digitize and also beware of the challenges. The study explores the process of digitization and identifies what must be

put into consideration in doing so it also identifies some of challenges facing this technology and their remedies.

It adds to the available pool of knowledge for academicians and forms a basis for further research probably in a different context where activities may vary from those in the Road Transport Department of Kenya Revenue Authority.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter examines existing literature on the fields touched by the topic of this research study. It seeks to explore the current understanding about Records Management and Digitization.

2.1 Records Management in Organizations

International Standards ISO 15489:2001 defines Records Management as “The act of management responsible for the efficient and systematic control of the creation, receipt, maintenance, use, retention and disposal of records, including the processes of capturing and maintaining evidence of and information about business activities and transactions in form of records.”

A record must be managed according to the principles of Records Management for it to be a record. Otherwise, once converted from one format to another, records would cease to be records. It is therefore imperative to understand Records management when dealing with digitization in order to ensure that records will still satisfy standards recommended for them to be so – records (Githaka, 2006).

2.2 Records Management System

Physical records are managed under the Records Management Lifecycle concept which is based on the idea that records become less important as time passes. Ninety (90) percent of the use of a record takes place during the first ninety (90) days after it is created. This short period of high use is followed by a longer period of low use. The records only need to be looked up occasionally during this second phase. Eventually, even this limited use will end and the records will have no further value to their

creator. This process is known as the lifecycle of a record (Cooke, 1998) and it comprises of several phases as described in the following subsections;

a) Maintenance Phase

At this stage, records are referred to as Semi-active records and more so are not needed for day-to-day business. Organizations need to keep them for reference, for legal reasons, or for financial reasons. They are not used often enough to justify their being stored in prime office space and equipment. Semi-active records are often stored at a lower cost in a records centre and are sometimes called “inactive records” (Barber, 2006).

b) Appraisal Phase

Appraisal is the process used to determine the value of records. During appraisal, records’ frequency of use (daily, monthly or yearly), administrative and operational values and needs served are established, legal and fiscal statutes and/or values tied to the record are also determined, record’s historical significance is considered and eventually record’s intrinsic –original - values is weighed (Roger, 2004).

c) Final Disposal Phase

Disposal chapter is the final decision made by the records managers and Archivists together with companies’ secretaries and organizations’ legal counsels at the expiry of retention period regarding records final destiny. Records found to be of continuing value are transferred to archives. Eventually, records with no further value to their creators are destroyed in a way that maintains confidentiality of organization’s information (Klaus, 1998).

2.2.1 Challenges of Managing Paper-Based Records

Paper records face challenges ranging mainly from space requirement, natural decay due to poor storage practices, limited access which is directly opposite of what

modern business re-engineering requires (Park, 2010). Hurdles in managing and using paper records have prompted information managers to consider prospects of ICT in assisting in managing paper records in more effective and efficient manner. Digitization not only helps in eliminating bulkiness of paper works, it also improves access and indexing, searching and retrieval of records. Some of the snags which have led to popularity of digitization are highlighted here under.

2.2.2.1 Personnel and Training Needs

To manage paper -records, personnel such as records managers and archivists are *sine qua non*. Though even electronic records require personnel to manage, it is possible to automate some processes such that, functions like archiving, disposal, transfer and storage of records demand less or no human intervention and cost thereof. Physical records must be handled by personnel in all stages of their lifecycle. Continuous training on immerging issues and best practices is a must for these personnel. It is also call for budgeting and thereby adding on the cost of managing records (Reiger, 2008).

2.2.2.2 Contemporary Business/Office Setting

Contemporary business models, collaborative workflows and virtual office concepts have led to paper records and other physical documents becoming almost inapplicable for business activities and transactions due to their restricted access, bulkiness and location and time dependence (Miller, 2006).

2.2.2 3. Space

According to Miller (2006), space is a major challenge in modern offices. Members of staff require only a sitting space in front of a computer and transactions are conducted. Virtual offices demand virtual storage of information for ease of access and communication. Paper works do not fit here and something has to be done to capture information previously held in those paper-records into virtual storage media. Considering amount of information created by organizations electronically and held virtually, if it were to be printed out and shelved, the cost for space to hold them would be prohibitively expensive.

2.2.2.4 Limited Access

Physical records are tied to time and location factors. One has to physically get the real record or its replica from where it is and time for its retrieval and use is a factor depending on whether someone else is using it. Physical records can only be used by a person at a time. To supplement their limited access, voluminous duplicates are sometimes necessary. As a result, cost for managing these extra copies in terms of labour and space augments (Elizabeth, 2010).

2.3 Digitization

Tech-savvy organizations are adopting new ways of attacking process transformation problems. These organizations see digitization as a complex combination of multi-channel process thinking, cross-enterprise integration, and business technology. This thinking increasingly shapes enterprise application innovation (Morris, 2003). Process transformation has three interrelated dimensions:

Changing Type of Process Interactions—new multi-channel processes are evolving from traditional uni-channel processes, changing Scope of Process Integration—processes are expanding from business unit-centric to cross-enterprise and inter-

enterprise and changing Degree of Process Digitization—processes and transactions are evolving from manual to automated systems. There are significant changes taking place in the way applications and supporting infrastructure are integrated. These changes are taking place under the broad umbrella of service platforms, Services Oriented Architecture (SOA), and Web Services.

Reasons for implementing a digitization project, or more precisely for digital conversion of non-digital source material, are varied and may well overlap. However, the decision to digitize may be in order to increase and improve access; this is the most obvious and primary reason, where there is thought to be a high demand from users and an organization has the desire to improve access to a specific collection.

It also seeks to improve services to an expanding user's group by providing enhanced access to the institution's resources with respect to organizational learning, Research and Development among others. Digitization also helps to reduce the handling and use of fragile or heavily used original material and create a "back up" copy for endangered material such as brittle books or documents. It gives institution opportunities to develop its technical infrastructure and staff skill capacity. Desire to develop collaborative resources, sharing partnerships with other institutions to create virtual collections and increase worldwide access is another force behind digitization.

Organizations seeking partnerships with other institutions in order to capitalize on the economic advantages of a shared approach find digitization to be an enabling avenue to achieve that goal. Organizations are able to take advantage of financial opportunities, for example the likelihood of securing funding to implement a programme, or of a particular project being able to generate significant income (Koopmans, 2004). It can also help in ensuring the availability of critical business documents for business continuity and disaster recovery.

The table below highlights the framework for a digitization project in typical context.

Table 1: Functions of digitization:

| <i>Table 2. Framework for a Digitization Project</i> | |
|---|--|
| <p>Creating digital collections encompasses a diverse array of activities. The list of main functional areas that follows represents a wide range of skills:</p> | |
| <p>Selection</p> <ul style="list-style-type: none"> - material selection based on research, learning, and teaching needs - copyright-status assessment | <p>Metadata</p> <ul style="list-style-type: none"> - descriptive, structural, administrative, preservation - controlled vocabulary, taxonomies, ontologies - selecting and implementing standards for interoperability, discovery, etc. - file-naming conventions and persistent IDs - OCR |
| <p>Requirements analysis to set technical requirements for:</p> <ul style="list-style-type: none"> - digitization - metadata - access and use - other repurposing areas (e.g., print on demand) | <p>Technical development</p> <ul style="list-style-type: none"> - repository and storage plan - digital content delivery platform (image database) - discovery and navigation tools - Web services - Web design and development |
| <p>Preparation</p> <ul style="list-style-type: none"> - conservation, disbinding, tagging - physical volume organization by content or format type | <p>Project management</p> <ul style="list-style-type: none"> - workflow coordination - financial management - assessment and usability analysis - promotion - user support |
| <p>Digitization</p> <ul style="list-style-type: none"> - digitization (in-house or outsourced) - image processing - creation of archival and derivative files - structuring | <p>Life cycle management</p> <ul style="list-style-type: none"> - preservation strategies and procedures - ongoing content, metadata, application revisions, additions, etc. |
| <p>Quality control</p> <ul style="list-style-type: none"> - development of a QC strategy - selection of QC tools - development of assessment workflow - plan for correcting and reintegrating unacceptable images and other deliverables | |

Source: Linden (2008)

Selection

It is important to see digitization as a series of choices where competing requirements and demands have to be balanced. When selecting source material for digitization, it comes down to three basic questions: whether the source material: Needs to be converted? Should be converted? And can be converted? (Linden 2008)

Criteria for selecting material for digitization include among others;

Content

Regardless of the purpose for implementing a digitization project, the selection of source material will always be more or less content driven. In fact, intellectual value is the basic question in all kind of selection: does the content (the value to the potential reader) of this material justify all the efforts, costs and other resources that will be needed? Therefore, every digitization project or programme ought to have its own definitions of value based on the goals it trying to achieve (Koopmans, 2002).

Demand

The level of demand is of course of great interest when selecting source material for digitization. If the purpose is mainly to enhance access, the likelihood of significant use of a digitized material will probably govern the selection process. Involving potential and current users of digitized materials in the original decision is a traditional selection methodology.

To balance the demands of different user groups many institutions have boards of scholars and other researchers to help them select material that is most urgent to digitize. When an institution digitizing activities are being developed from general proposals to specific projects covering whole collections or types of documents or objects, these advisory boards can be strategically important (Brown, 1999).

Condition

Selection of material for digitization will be affected both by its physical condition and by the existing quality of the bibliographical descriptions available for it. Material which is fragile damaged and in poor condition may present too many risks of further damage being caused by handling to allow it to be scanned without special care, or some basic conservation treatment. This will involve additional costs, and the institution will need to consider whether other collections in better condition should have priority, or whether the costs of preparation and conservation should be built in to the costs of the overall digitization project (Reiger, 2008).

Conversion

A digital image is an “electronic photograph” mapped as a set of picture elements (pixels) and arranged according to a predefined ratio of columns and rows. The number of pixels in a given array defines the resolution of the image. Each pixel has a given tonal value depending on the level of light reflecting from the source document to a Charge Coupled Device (CCD) with light sensitive diodes (Abby, 2001). When exposed to light they create a proportional electric charge, which through an analogue/digital conversion generates a series of digital signals represented in binary code. The smallest unit of data stored in a computer is called a bit (binary digit). The number of bits used to represent each pixel in an image determines the number of colors or shades of grey that can be represented in a digital image. This is called bit-depth. Digital images are also known as bit-mapped images or raster images to separate them from other types of electronic files such as vector files in which graphic information is encoded as mathematics formulas representing lines and curves. Source documents are transformed to bit-mapped images by a scanner or a digital camera (Monavich, 2001).

During image capture these documents are "read" or scanned at a predefined resolution and bit-depth. The resulting digital files, containing the binary digits (bits) for each pixel, are then formatted and tagged in a way that makes it easy for a computer to store and retrieve them. From these files the computer can produce analogue representations for on-screen display or printing. Because files with high-resolution images are very large it may be necessary to reduce the file size (compression) to make them more manageable both for the computer and the user. When a source document has been scanned, all data is converted to a particular file format for storage. There are a number of widely used image formats on the market. Some of them are meant both for storage and compression. Image files also include technical information stored in an area of the file called the image "header" (Abby, 2001).

The goal of any digitization program should be to capture and present in digital formats the significant informational content contained in a single source document or in a collection of such documents. To capture the significant parts, the quality assessments of the digital images have to be based on a comparison between those digital images and the original source documents that are to be converted, not on some vaguely defined concept of what is good enough to serve immediate needs. However, the solution is not to capture an image at the highest quality possible, but to match the conversion process to the informational content of the original – no more and no less. This raises two questions: (1) the attributes of the source documents to be digitized and (2) the image quality (Linden, 2008).

Attribute of the Source Document

At capture, consideration has to be taken both of the technical processes involved in digitization and of the attributes of the source documents. These attributes could be of

varying dimensions and tonal range (color or black and white). Source documents can also be characterized by the way in which they have been produced: by hand (ink), by a typewriter or printer, or by photographic or electronic methods (Gary, 1998).

The physical condition of the source documents can affect the conversion in different ways. Fading text, bleed-through of ink, burned pages and other kinds of damage sometimes destroy the informational content but more often set physical limitations on the possibilities of catching information during a scan. Therefore, the need for pre-scanning treatment of the source documents has to be identified. Neglecting this can not only be a threat to the documents themselves but can also limit the benefits and results of digitization and increase the cost (Stefik, 1998).

Ordinary steps to prevent this are for example, to carry out preliminary elementary conservation treatment, and to use book cradles for bound volumes, and routines to control lighting and other environmental conditions during the actual scanning. If the source documents have artifactual value they will normally need to be examined by a conservator before scanning (Smith, 1999).

When the risks of damage to the source documents are high and the documents are of special value or in bad condition, it can sometimes be better to scan from film intermediates instead of from the original documents, if such film is available (Gary, 1998).

Image quality

Image quality at capture can be defined as the cumulative result of the scanning resolution, the bit depth of the scanned image, the enhancement processes and compression applied, the scanning device or technique used, and the skill of the scanning operator (Egan, 2008).

Resolution

Resolution is determined by the number of pixels used to present the image, expressed in dots per inch (dpi) or pixels per inch (ppi). Increasing the number of pixels used to capture an image will result in a higher resolution and a greater ability to delineate fine details, but just continuing to increase resolution will not result in better quality, only in a larger file size (Gary, 1998). The key issue is to determine the point at which sufficient resolution has been used to capture all significant details in the source document.

A common definition of spatial resolution is the ability to capture and reproduce spatial details. It covers both input and output devices and that is probably one reason why the concept of resolution is one of the most misunderstood and misused technical specifications applied to digitizing equipment. Resolution is often specified in terms of dpi (dots per inch). However, dpi should normally be used only for printers, as “d” always refers to printed dots (e.g. ink jet printers and laser printers). For input resolution (i.e. scanners and digital cameras) and onscreen resolution (i.e. monitors) pixels per inch (ppi) normally should be used (Hazen, 1998).

Resolution targets, which were originally made for use in micrographic and photographic industries. They are normally used to measure the reproduction of details, uniform capture of different parts of a source document, image sharpness etc. The results can sometimes be not fully trustworthy, but resolution targets are still practical tools to use especially for bitonal conversion.

The Modulation Transfer Function (*MTF*), in which the spread of light in the imaging process (line spread function) is measured. This is a more reliable and objective way to evaluate how well details are preserved and suits best grayscale and color systems, Spatial Frequency Response (*SFR*), which means measuring the ability of the scanner

to transmit high-frequency information by means of a specified transfer function (in practice equivalent to MTF) and the physical size of a source document is of importance when determining the resolution (Berman, 2008).

When the dimensions of the document increase, the number of pixels needed to capture required details in it will increase too, as well as the file size. Large files can cause problems for users when viewing the images on a screen or in sending them over networks, because the file size has an important impact on the time it takes to display an image. One way to decrease the file size is to decrease the resolution. This is a critical decision, especially if the source document has both a large physical size and a high level of detail, which can be the case with oversized maps and drawings (Egan, 2008).

Bit depth is a measurement of the number of bits used to define each pixel. The greater the bit depth used, the greater the number of grey and color tones that can be represented. There are three kinds of scanning (digital sampling): Bitonal scanning using one bit per pixel to represent black or white, Grayscale scanning using multiple bits per pixel to represent shades of grey; the preferred level of grey scale is 8 bits per pixel, and at this level the image displayed can select from 256 different levels of grey and Color scanning using multiple bits per pixel to represent color; 24 bits per pixel is called true color level, and it makes possible a selection from 16.7 million colors (Berman, 2008).

The choice of bit depth affects the possibility of capturing both the physical appearance and the informational content of a source document. Decisions about bit depth therefore have to take into account whether the physical appearance, or parts of it, has an added informational value and need to be captured. This can be the case when the purpose of the digitization project is to produce facsimiles of the source

documents (Egan, 2008). There are several methods for evaluating resolution. Commonly used include the following:

Image Enhancement Processes

Image enhancement processes can be used to modify or improve image capture by changing size, color, contrast, and brightness, or to compare and analyze images for characteristics that the human eye cannot perceive. This has opened up many new fields of applications for image processing, but the use of such processes raises concerns about fidelity and authenticity to the original. Image processing features include for example the use of filters, tonal reproduction curves and color management tools (Egan, 2008).

Compression

Compression is normally used to reduce file size for processing, storage and transmission of digital images. Methods used are for example to abbreviate repeated information or eliminate information that the human eye has difficulty in seeing. The quality of an image can therefore be affected by the compression techniques that are used and the level of compression applied (Lesky, 2009).

Compression techniques can be either “loss less”, which means that a decompressed image will be identical to its earlier state because no information is thrown away when the file size is reduced, or “lossy” when the least significant information is averaged or discarded in this process. In general “loss less” compression is used for master files and “lossy” compression techniques for access files. It is important to be aware that images can respond to compression in different ways. Particular kinds of visual characteristics like subtle tonal variations may produce unintended visual effects. Digital images reproduced from photographic formats have a wide tonal range, commonly resulting in large files (Schatz, 1996).

Tonal Reproduction

Tonal reproduction is the most important of all image quality metrics because it gives the conditions for the evaluation of other image quality parameters. The effectiveness of these indeed assumes a satisfying tonal reproduction. In practice tonal reproduction determines how dark or light an image is as well as its contrast (Ayris 2008). Due to various (electronic) noises in the scanner there will always be losses in the bit-depth during a scanning process. It is therefore important to capture an image with a higher bit-depth than is needed for the digital output, for example at least 12 and 14 raw bits/channel to get an 8 bit output (grayscale).

Tonal reproduction is evaluated by a tone reproduction curve that relates the optical density of a paper document or a microfilm reproduction to the corresponding digital count (tone value) in the digital reproduction. In digital systems this curve is called the *Opto-Electronic Conversion Function* (OECF). Tonal values can also be assessed with a histogram which graphically shows the distribution of tones in an image and also the tonal range of it. Clippings in highlights or shadows compared to the tonal values of the source document can indicate that there are limitations in the dynamic range of the scanning device. Dynamic range can be described as the range of tonal difference between the lightest light and darkest dark and its value therefore shows the capacity of a scanner to distinguish extreme variations in density. Normally, the dynamic range of a scanner should meet or exceed the density extremes of the source documents (Linden, 2008).

Color Reproduction

The main challenge in digitizing colored source documents is to reproduce them with maintained color representation on screen or on printouts. The main problem is that monitors as well as operation systems and system applications display color in different ways. Human color perception also differs between individuals. There are several color models for defining the properties of the color spectrum. The most used are RGB and CMYK (Erway 1996). RGB stands for red, green and blue and is the model used by monitors and scanners.

The idea is to simulate a wide range of colors by combining different amounts and intensities of red, green and blue light. Each of these three colors is defined as a color channel, and on a 24-bit monitor each channel has 8 bits representing 256 shades. In 1996 a special standard RGB, called sRGB, was created for the Internet, and it is often used for monitors as well as scanners, digital cameras, and printers (Dale 2009). However, criticism has been made that sRGB is too limited and cannot reproduce all colors. Therefore, it is important to consider before buying a digital capturing system (camera or scanner) if this limitation is of significant importance in relation to the output required from the digitizing project. The CMYK model is based on cyan, magenta, yellow, and black. It is built on the principle that all objects absorb a certain wavelength from the light spectrum and always reflect an opposing wavelength. Printing and photographic systems are built on the CMYK model which also is called subtractive (Henry 2008).

Artifacts

Artifacts which affect the quality of an image are dust, scratches, and streaks. They all create a visible non-random fluctuation in light intensity, but how this affects the image quality differs depending on the out-put requirements. In most cases it is

enough to use existing software to detect artifacts, but sometimes visual examination is needed (Michal, 2007).

2.4 Collection Management

The possibility of being able to use a collection of digital images in the way it was intended depends not only on conversion standards and quality controls, but also on how the collection is managed. If the purpose is to meet not only short term needs but also to provide accessibility over time, steps have to be taken to satisfy both current use and the expectations of future users.

Plans must be made for example to: make scanned images appropriate to the ultimate intended use, upgrade distribution of images and user interface functionality, transfer images to new technical platforms to meet increasing capacity for processing and handling of digital information and migrate digital images to new file formats or physical media to ensure long-term accessibility (Judith, 2004).

To make scanned images usable, great concern should be taken relating to their storage. All image files that are produced by a digital image project must be organized, named and described in a way that fits the purposes of the project (Doculab, 2009).

Organization of Images

Before a name and a description of an image file is considered, it has to be decided how it should be stored. Normally, the source documents being scanned are physically organized according to principles of archival or library arrangement or any other logical plan suitable for its institution. Holdings of documents are often divided into series, volumes and issues, and collections of manuscripts and photographic items have numbers (Lynch, 1995).

The easiest way to handle this question is to translate the main principles of how the source documents are physically organized into a logical disc hierarchy in the computer. This should be done as far as possible according to existing standard systems. This is important to ensure the compatibility of file naming structures between different technical platforms. It must also be possible for the collection of image files to grow, and the way of organizing them has therefore to be scalable (Judith, 2004).

Naming of Images

Computers are not able by themselves to interpret logical relationships in a collection of source documents as for example sequences of folders and pages. Therefore, this has to be mirrored in the way the scanned image files are named. There are two approaches for this: (1) to use a numbering scheme that reflects numbers already used in an existing cataloguing system, or (2) to use meaningful file names. Both approaches are valid, and what best fits a certain collection or group of source documents should be chosen (Berman, 2008). Every digital imaging project has also to adopt conventions for names, for tables of signs and for rules relating for example to punctuation and to the use of capital letters. It is important that these conversions are uniform. A standardized vocabulary is one of the cornerstones in managing a collection of digital images.

File extensions are also important when giving names to image files. Many extensions have standard meanings and are employed widely, but care has to be taken when dealing with nonstandard extensions (Lesky, 2009).

2.5 Data Migration

Data Migration basically means migration of the electronic content from the original carrier to another medium and entails duplication for backup and continuity of

information. It is a part forming best practices in digitization by providing an avenue for continuity and survival of information. Migration and emulation would be appropriate ways of ensuring that digitization is propagated to the future as an adaptive technology due to their ability to hold information from one technology age to another (Margaret, 2005). Emulation enables the document stored in the original format to be viewed using the new hardware and software. As such, it utilizes software that data formats interoperable across different hardware/software. Data migration is done periodically to ensure continuing compatibility between file formats and applications. For instance, one can transfer data and information from a CD-ROM/RW to a DVD-ROM/RW due to media advancement to increase chances of its survival and to respond to technological press on. Data migration must be seen as a strategy to solve technological obsolescence (Lesky, 2009).

Challenges Facing Electronic Records Management

Digitization shares a lot of challenges with general electronic records management (Cohen, 2007). Electronic records management has not eradicated all problems in records management domain. It has become a way of life with its own difficulties to face (Lesky, 2009). Some of these challenges area as follows;

Media problems

New media appear all the time, including smaller magneto-optical cartridges ("floptical" and "ZIP" drives), a write-once technology called "optical tape," and new kinds of tape cartridges based on digital video systems such as D-1 and D-2. There are many other kinds of storage media that are almost forgotten.

Storage media are affected by the dual problems of obsolescence and decay. They are fragile, have limited shelf life, and become obsolete in a few years (Lesky, 2009).

Few computers today have disk drives that can read information stored on 8- or 5¼-

inch diskettes, even if the diskettes themselves remain readable. These media differ widely in their fragility. Some, such as CD-ROM and optical WORM, seem very durable. Lifetimes of 100 years are quoted by the manufacturers and the requirements for storage are fairly lax. Others, such as helical-scan magnetic tape, are much less permanent, and also much more vulnerable to storage at high temperature or high humidity (Matsushita, 2006). Given the rate at which computer devices become technologically obsolete, there is little safety in knowing the lifetimes of the various media (Michal, 2007).

Media Formats

Even worse than media problems, as suggested above, are the problems of formats on the media, because there are a great many more formats than there are media, and format conversion may threaten additional side effects or additional work. Examples are: Flexible Image Transport Systems- fits, FaceSaver- fs Group 3- g3 Fax GEM- gem, image files Graphics interchange forma- gift Gould scanner output- gould HIPS (from Human Information Processing Lab, NYU)- hips among others. Some of these formats are very common. Others are rare or obsolete. There is a perpetual need to migrate records in electronic format from one media format commonly known as *extension* to another as some become obsolete and other advanced formats emerge. This has rendered electronic records management a state of permanent exodus from one format to another (Matsushita, 2006).

Demand for backward compatibility and legacy support

Part of the challenge of managing electronic records is that they are produced by a mix of information systems, which vary not only by type but by generation of technology: the mainframe, the personal computer, and the Internet. Each generation of technology brings in new systems and capabilities without displacing the older

systems. Thus, organizations have to manage and preserve electronic records associated with a wide range of systems, technologies and formats (Horn, 2007).

Decentralization of computing environment:

The challenge of managing electronic records significantly increases with the decentralization of the computing environment. In the centralized environment of a mainframe computer, it is relatively easy to identify, assess, and manage electronic records. This is not the case in the decentralized environment of organization' office automation systems, where every user is creating electronic files that may constitute a formal record and thus should be preserved and still where a vital records can be permanently deleted by a press of a button (Ernest, 2007).

Complexity of electronic records:

Electronic records have evolved from simple text-based files to complex digital objects that may contain embedded images (still and moving), drawings, sounds, hyperlinks, or spreadsheets with computational formulas. Some portions of electronic records, such as the content of dynamic Web pages, are created on the fly from databases and exist only during the viewing session. Others, such as E-mail, may contain multiple attachments, and they may be threaded (that is, related E-mail messages are linked into send–reply chains). These records cannot be converted to paper or text formats without the loss of context, functionality, and information (Horn, 2007).

Massive Volumes:

Electronic records are increasingly being created in volumes that pose significant technical challenge to our ability to organize and make them accessible. For example, in U.S. among the candidates for archiving are military intelligence records

comprising more than 1 billion electronic messages, reports, cables, and memorandums, as well as over 50 million electronic court case files (Ernest, 2007).

Software and Hardware Dependency:

Electronic records are created on computers with software ranging from word-processors to E-mail programs. As computer hardware and application software become obsolete, they may leave behind electronic records that cannot be read without the original hardware and software (Michal, 2007).

Proof of Authenticity

With electronic records, other sources are required to verify “accuracy” because electronic records are not self-explanatory for validating. Electronic records that are authentic need to be accurate, and then to be considered accurate, they need to match other authoritative sources (Park, 2010).

The need of digitization of records towards promoting good governance has encouraged the digitization of records in many departments. Digitization offers advantages accessibility and retrieval, protection of data authenticity, data security besides the possibility to save and store in multiple formats. Once data is digitized, processing of files becomes easier and faster compared to the manual system Access to background data and keyword based search is possible with digitization. Furthermore, digitization enables access at multiple points at the same time thus the study will seek to establish how well digitization efforts have borne fruit in the KRA’s management of the RTD.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

This chapter concerns the research design, populating, sampling data collection and analysis.

3.1 Research Design

The study is qualitative and allows for the in-depth evaluation and investigation of concepts of interest. This is further enhanced by the selected approach (case study) which demands collection of information to describe the qualities of the concept of interest. It is trying to understand digitization in respect of activities involved their rationale and challenges in an organization in this case in KRA Road Transport Department. The issue of validity was addressed in this research by obtaining the views from two different perspectives, employees as staff in the digitizing department and users of digitized materials.

3.2 Study Population

KRA Road Transport Department is the population of this study. It has 306 employees (population) many of whom are clerical staff and mainly male.

3.3 Sample of the Study

The sampling strategy that was used for this research is purposive/convenience sampling. This is because purposive sampling strategies are designed to enhance understandings of selected individuals' or groups' experience(s) or for developing theories and concepts (Miles and Huberman, (1994).

Purposive sampling is used in cases where the researcher can select a more representative sample that can bring more accurate results than by using other probability sampling techniques. The process involves nothing but purposely

handpicking individuals from the population based on the authority or the researcher's knowledge and judgment.

The sample was conveniently picked to include those who are well versed with the operations in the various sections of the department.

A total of 15 respondents which included section heads and heads in ICT and RTD was picked. Judgmental sampling was applied in selecting respondents. Judgmental sampling is a non probability sampling technique where the researcher selects units to be sampled based on their knowledge and professional judgment. It is also known as purposive sampling and authoritative sampling.

3.4 Data Collection

Personal face to face Interviews using an interview guide were used to in obtaining data from respondents. Each respondent was allowed thirty minutes and their responses were recorded and later transcribed. The data is primary in nature..

3.5 Data Analysis

The data was analysed using content analysis. Content analysis offers several advantages to researchers who consider using it. In particular, content analysis looks directly at communication via texts or transcripts, and hence gets at the central aspect of social interaction and is is an unobtrusive means of analyzing interactions By measuring the semantic content or what aspect of the message is under study. It's a qualitative method of identifying, analysing and the data in rich detail similar to observational method but in this case what is studied is a representation of behaviour as opposed to the observation of actual behaviour. (Muganda, 2010).

CHAPTER 4: DATA ANALYSIS AND INTERPRETATION OF RESULTS

4.0 Introduction

This chapter concerns data analysis and research findings. Data collected included the following, demographics, the process of digitization, its rationale and challenges and it was analyzed as follows;

4.1. Demographic Information

Fifteen (15) respondents were conveniently picked to represent the RTD of KRA for the purposes of this research. They were top managers, supervisors and on the ground workers.

Two (2) managers were picked a male and a female who have worked with KRA for an average of over fifteen (15) years. They age above forty (40) years of age and their main duties are basically managerial and act as information conduits.

The supervisors are middle level management and their role is basically supervisory as well as heading sections in the division. Five (5) station heads from each of the stations that is registration, transfer logbook, registry and driving licence were picked where only one was female. Their ages varied from forty (40) to fifty five (55) years of age and work experience of over ten (10) years.

The huge chunk of workers lies here where eight (8) people were selected, five (5) females and three (3) males in an attempt to even out gender balance issues as observed in the managerial levels. The ages of the staff here vary from twenty (20) years to fifty (50) years and their nature of duties is routine based on the section each one is situated.

4.2 Activities of Digitization

Data collected revealed that digitization in KRA came as a part of reform and modernization strategy initiated in 2004 as a result of the advent of and the application of IT in business processes. It also came about to solve problems associated with physical files such as missing files, delayed retrieval and time and location limitations associated with paper records. In Road Transport Department (RTD), there was a need to convert historical records into the current electronic records to improve on their access.

In RTD, records are either digitized as images where source documents are scanned or as text where data entry is done from templates provided for such entries. For instance, when one is selling his/her car to another person, the new log book has to be scanned and captured on KoVIS. During the importation of a motor vehicle, critical documents that include bills of lading, invoices and Import Declaration Forms and any other document of long term importance are scanned and stored on Simba system used by the Customs Services Department and this information is shared by other users in the RTD on Vehicle Management Information System (VMS). These files are stored into an information jukebox as Kofile Visual Information System (KoVIS) images. The images are indexed to create an e-registry.

Records from external sources such as application for driving licenses, certificates of competence, driving licenses among others are not digitized into the system as yet. Driving licenses and documents related to their issuance involve many parties from driving schools, Kenya Police and KRA representing the government. This long chain involved in their processing (of driving licenses) poses a challenge in digitizing these documents. In fact, driving licenses book come from the government printer waiting to be written and sealed at RTD once KRA receives certificate of competence from

Kenya Police. However efforts are underway to introduce a smart card form of drivers license as is the case in some developed countries like the USA.

4.3 Rationale for Digitization

The study further revealed that at the beginning in 2004, KRA outsourced digitization services from external firms called COCEKE and ARAFLEX. With a budget of Kshs. 20 million, the management proposed for staff training and running of digitization activities. Currently, KRA/RTD has an in-house digitization department. ARAFLEX implemented digitization through data entry by using templates which allow data to be directly entered into the system. Data entry clerks using keyboards to key in data from files into the system. COCEKE used scanner and digital cameras to capture images into the system. In the first stages of digitization, ARAFLEX managed to digitize a hundred (100) files per day for four (4) months until all records were captured into the system. With time, the Authority owned the running and management of digitization activities by training its staff members and by introducing a digitization policy which provides guidelines on scanning and imaging processes. Currently, the process of digitization is ongoing on as-need-be-basis under full running by KRA/RTD department.

Once records are captured into the system through either scanning or data entry, an electronic collection is created. Records are captured into Vehicle Management System (VMS) and images captured as Kofile Visual Information system image files. These images are then indexed using the conventional indexing procedures to facilitate easy search and retrieval. They are also cross referenced and filed electronically such that there are no instances of missing files. E-registry has helped RTD realize provision of quality service and products to customers in real time. It has come as a result of modernization and reforms geared towards ensuring that

documents are secure and durable through the use of ICT and Business Process Improvement (BPI) strategies.

RTD is charged with the responsibility of custody and management of all records relating to motor vehicles and drivers in the country. The registry processes were initially supported by a limited back office information system which was largely manual and this made referencing and information retrieval very difficult. Connectivity with other departments was a great challenge. With electronic records as captured in media such CD-ROMS and DVD-ROMs, are available in Write Once Read Many (WORM) formats which unlike paper are not very vulnerable to wear and tear. WORMS also lock records and documents so that no illegal modification/editing can be done.

KRA/RTD document scanning and imaging is guided by a policy devised to meet all legal requirements for managing public records. Members of staff digitizing records must adhere to all specification details provided by this policy which comes as an operational manual. For instance, the policy stipulates which records must be scanned, the formats of captured data which meet records management and industry standards for managing public records.

To ensure that members of staff responsible for digitization understand the processes and procedures that go on in scanning and imaging processes, digitization policy is used as one of training items in the RTD. Digitization policy apart from being a training and guideline to digitization comes in handy as part of Business Process Automation (BPA) tool. Business Automation started with the development of the ICT strategy articulating the road map to integrated business architecture. Digitization has been realized to be one of factors which would enable a single view of the Tax payers across all KRA functions and facilitating operational excellence. This initiative

involves Customs System, Integrated Tax Management System, Vehicle Management System, Enterprise Resource Planning System, Data warehousing and Revenue Portal, Disaster Recovery and Business Recovery Plan among others.

Through digitization policy, staff members are able to learn how all these systems are supposed to be merged, support each other and facilitate best practices in information management.

4.4 Challenges Facing Digitization in Road Transport Department

Digitization at KRA despite being acknowledged as an important function is faced by the following challenges;

4.4.1 Continuity after Training

Shuffling of members of staff from one department to another has affected RTD significantly especially when trained staff members are transferred from RTD to other departments after training. All the training becomes insignificant especially when one moves into a department where one will not put in practice what they learnt from digitization training. Where revenue is concerned, staff members in KRA are required to be shuffled for integrity reasons. When one stays in one place for long time, it is believed that one usually learns the system loopholes and this could be used inappropriately for financial gains or sabotage. To avoid this, staff members are required to be rotated from one department to another.

Rotation has however affected digitization section by randomly moving those with skills to other departments.

4.4.2 Resistance to Change

Digitization promised and in fact achieved efficiency and effectiveness that was only imaginable in paper based document management system. Real time access, transparency and ease of access to records are some of advantages of digitization.

Traditionally, corruption has been partly facilitated by poor records management practices. Public offices are prone to ‘missing file syndrome’ whose solution was bribery to facilitate file retrieval. Corrupt officials who understood the mechanisms of electronic records system were rigid in accepting rolling out of digitization process because they knew it would seal the loopholes through which bribes came in such as “missing file syndrome” and availability of files throughout the whole organization. This challenge was however at the onset and with time KRA/RTD was able to overcome this opposition by training staff members.

4.4.3 System Expiry and Legacy Incompatibility

Since rolling out the electronic document and imaging processes in 2004, RTD has been required to upgrade its system and digitization system once. It was a requirement driven by the need for better Meta-data management. The previous system did not allow for complete capture of Meta data and relationship among data units and components. After upgrading the core system, there was a need to even upgrade the digitization tools. Due to incompatibility between the former and the current system, there is a need to maintain two separate systems. This is both expensive and cumbersome.

4.4.4 Data Migration, Testing and Refreshing

To ensure that data is always accessible and in current supported formats, data from legacy systems and storage media has to be moved into currently standardized formats; for instance, from ZIP disks to DVD-RWs, ROMs and Magnetic disks. After migration, data has to be refreshed to test if it is supported in the new format. Data migration is done periodically and involves budgeting and planning.

4.4.5 Budgetary Allocation

KRA/RTD receives an annual budget of Kshs. 20 million which is far too less the required ksh 150 million expenditure requirement to cater for state-of-the-art-equipment. Distribution and spending of this monies among all digitization need is a challenge since a lot has to be done within a very constrained budget.

4.4.6 On-going Training

Being centered in a very versatile IT environment, digitization activities are required to keep the pace with changes in the industry; software, hardware, standards and data files types. Staff training must keep in pace with these changes in order to realize full benefits of “electronizing” information. Due to fast changes in ICT world, acquired skills expire fast demanding new skills acquisition. Training thus requires huge sum of money which the budget cannot afford to cater for.

4.4.7 Record Format of Preference

All respondents noted that electronic records provide more alternatives and advantages compared to paper records. Access, retrieval, distribution and multiplication are fast, space requirement is minimal and one can access records online or from remote station away from the head office. Respondents also noted that since electronic documents do not seem bulk even if one has loads of work, they feel motivated to work on real time basis which sometimes allows them to measure their performance and analyze targets instantly.

However, some work has to be done in the traditional way especially the processing of driving licenses which is entirely manual. Comparing manual and electronic modes of working, respondents noted that one is able to work fast when using electronic systems. Movements from one office to another to pick up a file, missing files, waiting for another person in order to progress with one’s work are some of handicaps

in paper records office environment. This is rare in digitized infrastructure where documents are store in a central sever and accessed according to users' rights and privileges to view, access, modify or delete files. Respondents also noted that Electronic records are compact and can be backed up readily to protect from damage from wear and tear, fire, water, coffee etc.

Electronic records make it easy for RTD to integrate its information systems with others departments thus escalating in achieving even higher quality service. With electronic system monitoring vehicle registration, KRA/RTD is able to monitor trends in importation of cars and make rational decisions concerning transport industry. This is much easier compared to tedious work that would be done in paper records environment.

CHAPTER FIVE: SUMMARY DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter gives a summary discussion of the findings of the study and it also discusses on the relationship between the existing theory and results of the study, in line with the study objectives. It further gives a conclusion of the study, its relevance to policy and limitation and finally suggestions for further research

5.1 Key Findings

The findings reveal that digitization is a critical effort that must be expended in our businesses to effectively and efficiently manage records as presented in chapter four of the study, several conclusions can be drawn as to the importance of digitization.

Conversion of records in the RTD is in two phases. One, the use of computers in data capture as opposed to the traditional paper records and two, the scanning and storing of images in electronic form for such documents that can't be completely faced out for example the logbooks.

This initiative has facilitated electronic processing and retrieval of all documents easily. Digitization has also improved records and queue management, eliminating the "syndrome of missing files" and enhance quality of service delivery in the department.

The justification of digitization has to be sold to all the users of the systems in RTD. To ensure that members of staff responsible for digitization understand the processes and procedures that go on in scanning and imaging processes, digitization policy is used as one of training items in the RTD. Digitization policy apart from being a training and guideline to digitization comes in handy as part of Business Process Automation (BPA) tool. Business Automation started with the development of the

ICT strategy articulating the road map to integrated business architecture. Digitization has been realized to be one of factors which would enable a single view of the Tax payers across all KRA functions and facilitating operational excellence. This initiative involves Customs System, Integrated Tax Management System, Vehicle Management System, Enterprise Resource Planning System, Data warehousing and Revenue Portal, Disaster Recovery and Business Recovery Plan among others.

Through digitization policy, staff members are able to learn how all these systems are supposed to be merged, support each other and facilitate best practices in information management.

5.2 Conclusion and Recommendations

From the analysis of data collected and analyzed in chapter four and the discussion above, it is evident that the RTD has improved its operations tremendously owing to digitization. Processes that took a long period of time to complete now take a shorter period. Incidences of lost records have completely reduced and transparency advanced. Further, storage costs for some documents have considerably reduced since they are stored in electronic formats as opposed to physical paper.

Further, electronic records make it easy for RTD to integrate its information systems with others departments thus escalating in achieving even higher quality service. For example, the synchronization with customs services department to register imported vehicles as well as charge them VAT. With electronic system monitoring vehicle registration, KRA/RTD is able to monitor trends in importation of cars and make rational decisions concerning transport industry. This is much easier compared to tedious work that would be done in paper records environment.

However, some sections are still hard at work to ensure complete digitization for example the driving license section whose ambition is to have an eDL that is less

cumbersome to produce than the current generation of licenses and less prone to fraudulent manipulations.

Government through its departments will be able to sell its policies to the public and other stakeholders through digitization, through enhanced access to information, public will be able to hold its elected leadership accountable for their actions, business community will also be able to transact with ease with the government.

Further, this study will be used by other players in the industry who generate a lot of paper records to enable them digitize for example libraries, schools to mention a few.

This will help in informing their decision to digitize and also beware of the challenges

The study explores on the process of digitization and identifies what must be put into consideration in doing so. It also identifies some of challenges facing this technology and their remedies. It therefore adds to the available pool of knowledge for academicians and forms a basis for further research probably in a different context

5.3 Limitations of the Study

The limitations encountered in the course of the research are highlighted as follows;

The mode of responses

The data collected was from interviews and content analysis method was used for data analysis. Thus with regards to the interview findings, the study relies on respondents self-reports and recollections of their actions, and carries with it the assumption that these self reports will provide an accurate picture into digitization as is done at the Road Transport Department. While these limitations are acknowledged, previous use of the content analysis method (Muganda and Fadhili, 2010) has demonstrated that this method can effectively tease out the tacit knowledge applied by respondents in performance of key tasks.

Limited Local Studies

There are very few locally known studies of the Challenges of Digitization in the Kenyan context. The study therefore relied mainly on literature from studies done in other countries which operate in different cultural, economic and socio-political contexts to formulate the conceptual framework.

Bureaucracy

KRA being a parastatal has stringent rules on information sharing and authorization has to be sought from Senior Deputy Commissioner Human Resources before one can embark on data collection. As such, the time taken from request of approval to collect data and the actual authority being granted is considerably long.

5.4 Suggestion for Further Research

The study should be considered as a first step towards a deeper understanding of digitization of public records and management of the process. This work therefore sets up future contributions that will enable scholars, government, libraries and businesses to better understand different issues surrounding digitization and ways to use it to enhance governance and business processes.

Further, the research can be done with the focus being another government office or even in the private sector to facilitate comparison of findings and to further solidify deductions.

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APPENDICES

Appendix 1: Introduction Letter from the University of Nairobi


UNIVERSITY OF NAIROBI
SCHOOL OF BUSINESS
MBA PROGRAM - LOWER KASIKI CAMPUS

Telephone: 020-2059162
Telegrams: "Varsity", Nairobi
Telex: 22095 Varsity

P.O. Box 30197
Nairobi, Kenya

DATE... 29th September 2010

TO WHOM IT MAY CONCERN

The bearer of this letter ... Minam Wangui Kabui


Registration No: ... D65/70903/2007

is a Master of Business Administration (MBA) student of the University of Nairobi.

He/she is required to submit as part of his/her coursework assessment a research project report on a management problem. We would like the students to do their projects on real problems affecting firms in Kenya. We would, therefore, appreciate if you assist him/her by allowing him/her to collect data in your organization for the research.

The results of the report will be used solely for academic purposes and a copy of the same will be availed to the interviewed organizations on request.

Thank you.


UNIVERSITY OF NAIROBI
SCHOOL OF BUSINESS
MBA OFFICE
P. O. Box 30197
NAIROBI

DR. W.N. IRAKI
CO-ORDINATOR, MBA PROGRAM

Appendix 2: Request Letter to Senior Deputy Commissioner HR

Miriam Wangui
GT8/00000002,
P.O Box 79,
Othaya.
01/11/2010

Attn: SDC Human Resources,
Thro' SAC, Human Resources,
Kenya Revenue Authority,
P.O Box48240-00100,
Nairobi.

Dear Sir/ Madam,

RE: CLEARANCE TO COLLECT RESEARCH DATA.

I am a Post graduate student at the University of Nairobi undertaking Master in Business Administration majoring in Management Information Systems and carrying out a research on the *Challenges of Digitization: A case of KRA' Road Transport Department* in partial fulfillment of the requirements of the aforementioned degree.

My student registration number is D61/70903/2007 and a letter from the institution is attached for your attention.

Kindly expedite in approving my request to enable me collect data in time.

Kind regards.

Yours truly,



Miriam Wangui

Appendix 3

Interview Guide for the investigation of the process and challenges of digitization: a case study of Road Transport Department, Kenya Revenue Authority

To help me gather the information from the case study respondents during the interviews, the following guide was used to guide the interview and arrange my thoughts

| | |
|---------------|--|
| Descriptions: | Demographic information about the respondent that include age, sex, duty station, nature of duties and period of time worked at the section and the authority as a whole and number of staff in any given section as well as their competence. |
| Digitization: | How does respondent understand the process? When did the process begin and how long did it take? Which records have been digitized so far, which ones have not? Who was engaged to conduct the digitization? What was the approach employed? (Activities of digitization) What is the level of staff involvement in the process? What security issues were experienced in the process? Are there trainings conducted to orient staff with expectations? What is the digitization policy? |
| General: | Briefly walk me through the achievements made so far since digitization efforts commenced at the section. How have the processes changes since digitization? Are tasks easier or harder to accomplish? What have been the challenges of digitization? |

Appendix 4: Letter of Approval from Senior Deputy Commissioner HR



Kenya Revenue Authority

Ref: GT8/00000002

7th December, 2010

Miriam Wangui,
Graduate Trainee
NAIROBI

Dear Madam,

RE: REQUEST TO CONDUCT RESEARCH

We refer to your application dated 4th November, 2010 on the above subject.

We are pleased to inform you that approval has been granted for you to conduct research on your project in the field of *“Challenges of Digitization; A case of KRA’s Road Transport Department”*.

We however, wish to remind you that this research should be only for academic purposes and any data or information given to you should be treated with utmost confidentiality. A copy of the research paper should also be sent to the Senior Deputy Commissioner, Human Resources for our records.

Yours faithfully,

A handwritten signature in blue ink, appearing to read 'Alice Munyao'.

Alice Munyao
For: Senior Deputy Commissioner – Human Resources
Rkn//

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