UNIVERSITY OF NAIROBI

APPLICATION OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN PUBLIC ASSET MANAGEMENT: A CASE STUDY OF MERU COUNTY, KENYA

By

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DECLARATION

This research project is my original work and has not been presented for the award of a degree in any other university.

Signature..... Date.....1/8/2022.....

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

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DEDICATION

I dedicate this research project to my late parents Mr and Mrs Joseph Ngari who instilled the value of education and the drive to succeed in educational pursuits.

ABSTRACT

This study aimed at exploring the extent of deployment of ICT in public asset management with reference to assets owned by County Governments in Kenya. It was guided by the following research objectives: to identify asset management functions that are currently performed with ICT technologies and potential areas of application of ICT in public asset management, to identify specific ICT technologies and devices that have been deployed in those functions, and factors that hinder the deployment/implementation of ICT in management of county public assets in Kenya.

A case study research approach using both quantitative and qualitative data was used to provide an in-depth view of the issue under investigation. Meru County Government in Kenya was selected because of its recent efforts to deploy ICT technologies prompted by Auditor General Reports of 2018 which revealed inadequate asset management practices in the County, which if addressed could offer useful lessons for other Counties in Kenya. The survey sampled 219 participants from the Meru county government. To assemble pertinent information from the participants, this survey employed self-administered questionnaires, open-ended interview guide and reviewed secondary documents and reports from Meru County government. The study adopted descriptive statistics including percentage and mean scores in data analysis. Tables and figures were used to present the research findings.

The study identified asset management functions that are currently performed with ICT technologies and potential areas of application of ICT in public asset management in Meru County Government. The records management is highly automated at 91%, followed by land management at 88.8%, then land transactions at 84% and land surveying at 83%. The study revealed that land information management system is highly deployed at 88.8% and helps in

management of land information in the county, followed by geographic information system (GIS) at 80.3% that assist in surveying and mapping. Block chain technology has never been deployed in the asset management of Meru County government. The study also identified challenges hindering the deployment of ICT in the management of the County assets. The highest challenge came from security of data through cybercrime and cyber-security vulnerabilities at a mean score of 3.94, followed by limited resources from the county at a mean score of 3.81. The least challenge came from fragmentation of the county government asset management and lack of employee knowledge and skills.

The study concludes that Meru County Government is in the process of fully computerizing its asset management functions and that lack of essential infrastructure to support adoption and implementation of technology in asset management compromises the security of county information. The study recommends Meru County government to install effective information management system fashioned to help the user make, organize, disseminate, store, and preserve documentation for the asset management functions.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The solution to continued existence in an exceedingly competitive environment for any organization (Karanja, 2001) is the aptitude to effectively get the most out of the huge potential of enhancing technology and channeling it for the strategic and economic interests of the organization. Porter (1980) laid emphasis on the use of competitive approach as the means to attain competitive benefit and as a result underlined the utilization of technology to empower organization's capacities. The author asserted that technology may facilitate public and private firms to do extremely well in the competitive world. In the circumstance of public asset management, the development and deployment of technology offers a fresh chance to enhance service delivery.

Information and communication technology (ICT), according to Blurton (1999) is well known as a varied group of technological tools as well as resources employed in communication to make, distribute, store, and manage information. This convergence of computers, telephony, and communications has been remarkable over the last decade and continues to transform the way humanity live and work.

Indeed ICT has emerged to be critical toward the development of any society and has become the driving force in the growth of economies worldwide. Through the facilitation of information availability and accessibility, ICT holds tremendous promise as an enabler of social and economic growth. At the most basic level, ICT enables organizations to perform tasks that are humanly impossible thus increasing productivity. In addition, productivity leads to a competitive edge and therefore stimulates economic growth (Mills, 2008).

Information technology (IT) installation and the techniques are being utilized by organizations for data processing, storage, communication, distribution of information, automation and many more. Moreover, the evolution of the internet, World Wide Web (WWW) and storage devices have transformed information communication technology. Subsequently, identifying the benefits of information technology in managing public assets and especially assets owned by county governments is essential to provide top-notch services to the public in a devolved system of governance.

Despite acknowledgment of the benefits associated with ICT in asset management such as rapid and precise information, enhanced generation of revenue, decentralization of planning, effectual operational control, environment enabling paperless operations and reinforcing of both inter and intra-organizational communication structures, most public and even private organizations are very slow in embracing ICT technologies. According to Kirkwood (2004) the speed of uptake of technology is determined by identifying business and social needs along with beating obstacles to innovation predominantly the forces that hinder innovation. He further notes that new technology disrupts existing processes and practices, which at times results in resistance by those who feel threatened.

Property asset management, asset maintenance, agency, valuation/appraisal, and portfolio management are the core ICT applications for the real estate industry (Kirkwood, 2004b).

In corporate world, most organizations have embraced technology to enhance effective and efficient asset management. Actually, many asset management tools and principles have been developed and applied in organizations serving the sole purpose of minimizing cost by maintaining productive assets to enhance the bottom-line.

Against these backdrops, there has been an extensive demand of the call for better management of assets within the local authorities in most cities in the world. Perhaps this is in recognition of the fact that assets support efficient delivery of services in every organization and are not only important items but also expensive to maintain and represent significant chunk of investment.

In Kenya, appeal for prudent management of asset practices in public arena has been driven by the decentralization of governance as anchored in the new constitution. The new legal framework has led to increased scrutiny of public assets and especially those owned by County Governments. Moreover, there has been less information on many public assets and this has led to the assets being disposed without proper audit leading to the loss of public assets (Law of Kenya, 2012; Okundi, 2012).

The majority of counties have automated or are automating their systems to improve coverage, increase collection efficiency, and decrease revenue theft. Contrarily, despite their significant capital expenditure on the balance sheet, counties lag behind in automating asset management operations. Inadequate local government attention to asset management is attributed by Kaganova and McKellar (2006) to the perception that public assets are "free goods" in traditional society.

Largely, there is absence of effective, vigorous and perfect methods to keep trail, authenticate and assess public assets with confidence. These problems of assets traceability keep on bedeviling the counties after every five years of electoral transitioning consequently the general public assets keep on being misappropriated with little liability (Mwaniki, 2018).

Furthermore, the fragmentary nature of public asset management and low adoption of ICT has led to excessive loss and embezzlement of public assets. Managing county assets is highly technical and requires professional expertise along with knowledge of specific tools such as assets

management systems. Besides, given how large and complex county asset portfolios are, implementing ICT in asset management functions is paramount if at all county governments are to achieve their service delivery goals effectively.

According to the findings of Konyimbih (1996), it is very much usual to hear of missing or misplaced files in public institutions. This provides an avenue where public assets have been encroached, grabbed and disposed of. In these entire situations, one wonders what is wrong with the management of the public assets and whether it can be reclaimed. This query points to problems in public assets management. Therefore, the purpose of this study was to evaluate the degree to which ICT technologies are being used by county governments to manage public resources, with a focus on the government of Meru County. The study identifies specific asset management functions that are performed with ICT technologies and potential areas of application of ICT with a view to promote efficiency and effectiveness in managing county properties.

1.2 Problem Statement

County governments in Kenya lack appropriate asset management systems. Public asset management techniques and processes are underdeveloped in many nations, including a number of affluent nations. Still, necessary measures are still lacking for municipal assets, such as inventory, computerization, and trailing revenues, values, and expenses (Kaganova & Nayyar-Stone, 2000).

County governments in Kenya are among the largest owners and occupiers of fixed and movable assets in the public sector. County asset types range from land, buildings, plant, machinery and equipment, software, furniture, infrastructure, biological assets, heritage assets, cash, bank balances, cash equivalents like call deposits, investments, outstanding imprests, advances and

receivables and bundles of rights. However, there has been inadequate management of these assets to commensurate their huge capital expenditure.

The call for enhanced management of county assets is on account of devolution where counties' huge assets portfolios were exposed in terms of what they own. For instance, during the transition from Municipal council to County, only 32 Counties had submitted their reports to the County Assets and Liabilities Committee while 15 counties had no comprehensive register of their assets. Additionally, because they did not contain all of the assets inherited from the disbanded local government, the majority of the non-financial registries were lacking. In actuality, these registers were hardly ever valued and aged. On instance, at the time of the assessment, some counties continued to use the 2015 Transition Authority Report for Assets and Liabilities (Kippra, 2019).

Public assets, like human, financial, and information resources, contribute to the success of the business and must be handled successfully and efficiently. These assets must be effectively managed to ensure that their values are sustained and extended over a lengthy period of time (Mohd Isa, 1999). The majority of firms do not prioritize real estate assets and lack adequate management, according to Kariuki and Nzioki's (2010) study on the administration of commercial real estate properties in Kenya. The study also highlights the inadequate institutional management training, highlighting the necessity for both the public and private sectors to prioritize public asset management.

A report by Auditor-General in 2012 revealed that three quarter of local authorities across the country were indebted to a tune of over Kshs. 14billion. In addition, the report noted lack of proper asset records.

Recently, the Auditor-General's audit details for the year ended 30th June, 2018 for Meru County revealed a huge variance on the Integrated Financial Management Information System (IFMIS) statement compared with the financial statement presented for audit. For instance, the auditor notes significant variance on acquisition of assets reported on financial statement with that of IFMIS to a tune of under negative Kshs. 239,333,237 (Auditor-General, 2012, 2016, 2018).

The report further notes similar inconsistency on fixed assets statement indicating a book value of Kshs. 5,645,141.234 asset as at 30th June 2018, however, the fixed asset register returned a balance of Kshs. 5,320,537,532 resulting to unexplained and un-reconciled difference of Kshs. 324,604,707. In addition, about 1,198 items in the register had no historical cost while 22,564 items had no acquisition date. Perhaps this mismatch of data would have been addressed by using appropriate ICT.

Similarly, an audit on Meru County and defunct Local Authority by Auditor-General (2014) reveal major flows on installed information systems ranging from inadequate infrastructure, human capacity, lack of procedure, inadequate resource among other factors. For instance, the report notes that though the county had received personal computers and IFMIS they still used manual transactions. By and large the information systems set in place were geared toward revenue collection. This problem is replicated in almost all counties including other state agencies.

Kaganova and McKellar (2006) state that public assets management has not drawn adequate consideration of researchers as well as scholars regardless of the significance of in both established and up-and-coming markets. This is also supported by a survey carried out on present position of public asset management in a variety of great European cities. Deloitte (2011) demonstrated that it is challenging to draw together pertinent assortment of data; partially for the reason that public

access to such kind of information is every so often constrained, but mostly because this kind of information is basically not available or scarcely available inside municipalities.

Literature, deliberations as well as discussions on the subject of public assets management have been scanty (Kaganova & Mayyar-Stone, 2000). Globally, several studies have been carried out on ICTs and their associated applicability to real estate practice both in developed and developing economies (Oyetunji, Ojo, & Oyetunji, 2018b). However, bulk of these studies is mainly inclined toward impact on real estate.

For instance, Dixon (2005) suggests that ICT only has a social technological impact on real estate when analyzing the final output of ICT on the industry. However, the foundation of this research project is a qualitative analysis of a literature survey on commercial real estate.

Kiama (1995) explored why hardly there are no estate manager in Industrial Real estate in Kenya. Her finding reveal that estate management functions are done by unqualified or rather untrained personnel, whereas the study supports the argument advance for the absence of specialized human capacity in managing real estate which is also the case in county government where heavy investments are required in professionalizing their real estate management sector.

The study by Kiama did not take place in the Kenyan county governments hence this study is filling in the gap by studying the application of ICT in county government asset management.

Ndungo (2009), examined uses of GIS database on real estate management with emphasis on residential rental houses in Infill-Komarock. Her study illustrates various capabilities in which geographical information system can enhance real estate management.

Mutunga (2012), in studying methods of managing properties as well as its association to customer satisfaction using a comparative design, found positive significant correlation between approach used in management of commercial properties within Nairobi CBD. However, her study does not point out any relation in use of ICT.

Yahya (2004) conducted a study to examine the extent of information technology and the trends, innovation and best practices in use of IT in corporate property management in Nairobi. The study further examined the benefits, use and challenges posed by ICT. Using three case studies, a private (corporate), semi-public (parastatal) and a professional property management firm, the study revealed that there was variant extent of ICT use. The study further observed at minimum standard or conventional package in daily routine. Conversely, the author noted myriad of challenges including cost, training, complexity and fast advancement in ICT. Even though her study tackled ICT and property management that is similar to this study, her study did not address ICT and asset management in county governments.

Gitau (2010) investigated the use of ICT in Kenyan real estate enterprises. The study found a considerable favorable impact on how real estate businesses carry out their activities using a questionnaire survey of 153 randomly chosen firms in Nairobi's central business area.

Ojo, Oyetunji, and Oyetunji (2018) investigated the challenges to ICT adoption in Nigerian real estate. When the real estate companies in this zone were polled using a straightforward stratum of 5 zone business district, 83.14 percent answered to the questionnaire. Investigating weighted mean score identified the main barrier as rapid changes in ICT, followed by complexity in operating a lot of packages and high execution costs.

Perhaps major significant works on ICT in asset management is illustrated by Mwaniki (2018). The study demonstrates using a model, unchallengeable peer to peer publicly reachable and disseminate-able resource ledger to imitate consensus management of assets founded on the innovative block-chain technology. However, the model focuses majorly on the database, therefore, it would face challenges since block-chain technology is immutable hence un-applicable to some of public asset that require to be disposed after their usefulness.

The findings of most research on ICT usage and its application have not revealed much in regards to public real properties. This study, therefore, aims at filling some of these research gaps that exists by examining the adoptability and application of ICT in management of county Assets.

1.3 General Objective

The overall objective of this research is to examine the extent of deployment of ICT in public asset management with special reference to assets owned by County Governments in Kenya.

1.4 Specific Objectives

(i) To examine asset management function that are currently performed with ICT technologies and potential areas of application of ICT in public asset management.

(ii) To identify the specific ICT technologies and devices that have been deployed in those functions.

(iii) To establish factors that, hinder the deployment/implementation of ICT in management of county public assets in Kenya.

1.5 Research Questions

(i) What asset management functions are currently performed with ICT technologies and potential areas of application of ICT in public asset management?

(ii) What specific ICT technologies and devices have been deployed in the asset management functions?

(iii) What factors hinder the deployment of ICT in management of county public assets in Kenya?

1.6 Hypothesis

The following null and alternative hypotheses, based on the study's goals on the use of ICT in public asset management with a focus on assets owned by Meru County, served as the foundation for this investigation.

Hypothesis H_0: Slow adoption and implementation of ICT has no significance influence on efficiency and effectiveness of public assets management in Meru County.

Hypothesis H_1: Slow adoption and implementation of ICT has significance influence on efficiency and effectiveness of public assets management in Meru County.

1.7 Significance of the Study

This research study enables county governments appreciate the importance of ICT in Asset management. Through this study, county governments understand the asset management functions that can benefit from automation and help in proper asset management. This study also help the

county governments understand factors that hinder deployment of ICT in management of county public assets hence institute strategies that help in countering the challenges and offering quality services to the public.

The study is also useful to professional property managers in that it enlightens them on the functions of asset management and how application of ICT helps in appropriately managing public assets.

This research study enhances the existing knowledge in areas of ICT and asset management. In addition, this study fills the existing knowledge gap on application of ICT in asset management especially in county governments of Kenya. The study also provides a basis for existing and upcoming scholars to build on their studies in matters to do with ICT and public asset management.

1.8 Scope of the Study

The use of ICT to asset management in Meru County was the sole focus of the research project. The Meru County Government in Kenya was chosen as the case study area due to the county's recent efforts to embrace ICT in order to highlight challenges being experienced, as well as its weaknesses in asset management practices as revealed in the report of the Auditor General and other secondary reports as cited in the study.

The study specifically focuses on Meru county key personnel that are tasked in asset management such as financial head, procurement department and end-users.

1.9 Organization of the Study

There are five chapters in this research study. The first chapter offers an overview of the research study and describes its history, research problem, aims, research questions, and study hypothesis, as well as its significance, range, and design. The literature evaluation in Chapter 2 of similar studies that highlights the limitations that impacted the research and supports the need to continue the current investigation. The notion of asset management, the degree of ICT use in managing public assets, devices, and technology are all covered in the literature study. ICT's promise for asset management was examined in the literature, which was followed by a discussion of the barriers to ICT adoption. The research approach for the study is presented in full in Chapter 3. The research design, data collecting, data analysis methods, data reliability, research ethics considerations, and operational definitions of constructs are all outlined. The data analysis and study findings are presented in chapter 4. The overview of the research findings, conclusions, and suggestions is illustrated in Chapter 5.

1.10 Summary

This chapter introduced the research study by discussing the background of the research problem, the gaps in the literature, and the goal and significance of the investigation. The three research goals, the corresponding research questions, the null hypothesis being tested in the study, and the justification for the study were all again covered in detail in the chapter. The study's arrangement is offered as a conclusion. The review of the literature on the use of ICT for asset management is presented in Chapter 2.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

It is widely acknowledged that successful public asset management necessitates an interdisciplinary approach, in which traditional disciplines such as accounting, engineering, finance, the humanities, logistics, and computer systems technologies should work in tandem. Again, asset management is a crucial but challenging corporate activity. This chapter discusses the management of public assets as well as practices and functions of managing public asset, ICT application in public asset management, and the reasons that hold back application of ICT in management of public assets.

2.2 Asset Management

There are numerous definitions of asset management that cover various uses and aspects. The coordinated use of a business company's assets to recognize value that emanates from them is known as management of public assets (Lutchman, 2009). American Association of State Highway and Transportation Officials (AASHTO) (2008) said that management of public assets is a recent effort to merge finance, planning, engineering, personnel, and information management to aid agencies in managing assets in a cost-effective manner. Asset management is defined in its broadest sense as "a systematic process of maintaining, upgrading, and operating assets, combining engineering principles with good business practice and economic logic, and providing tools to facilitate a more organized and flexible approach to making the decisions necessary to achieve the public's expectations" (OECD, 2011). Enhancing decision-making procedures for allocating resources among an agency's assets in order to achieve the best return on investment is the main objective of asset management. Asset management supports all of the processes, devices, and information required for efficient management of public assets in order

to achieve this goal (Nemmers, 2010). This justification also refers to asset management as "a process of resource allocation and utilization" (AASHTO, 2008).

Jim (2016) defines asset management as "a continual process-improvement method for enhancing the availability, safety, reliability, and longevity of assets," including systems, facilities, equipment, and processes. It looks like an up-and-coming subject that has been recognized as an essential instrument in identifying as well as instituting additional proficient along with effectual institutions. It is imperative not just for private companies, but as well for government at the county as well as the central level.

Asset management though seldom studied, (Bever, 2011) argues it is an old discipline as commerce and has constantly evolved from agrarian age, industrial age, the information age, and now the virtual age. Traditionally, human beings have been engaging in the purchase, use, maintenance, alteration, and discarding of vital assets since time immemorial. These days, Kooymans and Abbott (2014) found that asset management goes beyond just maintenance of the assets. It is the method of deciding, planning as well as controlling over the purchase, use, protecting and discarding of assets so as to capitalize on their delivery of potential service as well as manage related threats and expenses over their whole existence.

Ching (1994) states that asset management is the organization of activities that are undertaken to fulfill occupancy and functional requirements of any asset, with the implementation of those activities being divided into facilities management, building management, and portfolio management. His study focused on the implementation of managing corporate real estate assets in local government asset management.

Contrary, Dent (1997) stated that asset management is the process in which one converts information into action by directing along with supervising all concern in the landed assets with the intention of protecting the most favorable return both financial, social gain, reputation, political or other goals. As noted by Kaganova, *et al* (2012, asset management is the practice of guaranteeing that public assets are controlled for most favorable temporary and lasting performance including cash flow as well as the improvement of worth.

In the private sector, assets are owned and controlled for two main reasons. The first reason is a profitable venture. The second reason is to think about assets as a supplementary device for the possessor to accomplish the main goals of products manufacturing as well as services delivering. For whichever reason, the chief purpose of managing asset is to capitalize on worth of the assets. Nonetheless, the worth to be exploited doesn't essentially denote monetary worth. It also indicates cultural worth, social worth, as well as environmental worth (Fernholz & Fernholz, 2014). At the point whereby an asset is owned as a venture, asset management emphasizes on financial profits on the asset (Edwards & Ellison, 2011). Making the most of the after-tax return on the basis of cash flow while lowering operating and finance costs will enable this to be satisfied (Simons, 2004). However, there are situations like this where the owner of the assets is more focused on other objectives than on maximizing financial gain (Friedman, 2001). Similar to how managing present assets could shift focus to owner satisfaction. Unlike operational assets, fixed assets are often acquired as part of an asset owner's endeavour to provide services for a company's actions rather than for financial reasons (Edwards & Ellison, 2011). Non-current asset management charges are included in business enterprise costs. As of this viewpoint, the goal of managing asset is to make the most of the value toward assortment of assets with the intention that suitable services are offered at moderate price. On the other hand, Friedman (2001) showed that when owner of the

assets is the only occupant, assets management has to bear in mind the representation of possessor in the practice of management. By this instance, the rule of end result proceeds might not be as imperative as in new instances of managing non-current assets.

For whichever reason of owning assets talked about above, managing asset ought to go by golden rule of attaining bulk at smallest expenses. Normally, the effect of assets management duties on assets is an obligatory component managers of assets should keep in mind while computing the expenditure of assets management. Furthermore, effectiveness as well as efficacy is vital rudiments during trimming expenditure and enhancing services (Jim, 2016).

In public arena, normally speaking, agencies of the government do not make goods as well as offer services for monetary proceeds. The government does not also fund asset purchase and offer services with fixed assets it possesses chiefly for profitable purposes. As a matter of fact, public asset management applies extremely small attempt to generate money (Simons, 2004). Public asset as defined by National Research Council (2005) are possessed and let out to serve asset managers in satisfying duties of the government, to give services to the community, as well as to offer places of work in favor of the workers. The purpose of managing municipal assets is to support proficient as well as economic utilization of real properties owned by the government (Government Accountability Office, 2002). Asset management acts as a means to fairly share out some resources of the public.

The aims of managing public assets as revealed by Kaganova and Nayyar-Stone (2015) ought to be commonly categorized into two groups: non-conventional as well as conventional. The conventional aim is to provide suitable assets for offering community services as well as goods at the minimal fee, considering the market assessment (Fernholz & Fernholz, 2014; Dent & Bond,

2014). The United States Federal governments along with a number of state governments, which execute centralized management of asset, offer effectual as well as efficient assets management services that are like aggressive like in the industries in private sector. Agents of the government are permitted to choose private realties services once they discover the services offered by the federal agency on managing assets are unsuitable in costs as well as quality. Distinctive cases in point of the non-traditional aims consist of supporting development of the economy, developing sources of governmental income, along with encouraging social development (Simons, 2004; Fernholz & Fernholz, 2014; National Research Council, 2005; (Kaganova & Nayyar-Stone, 2015). The non-traditional objectives can be executed by means of land distribution, public housing plans, discarding of excess assets, and environmental projects, among other approaches. In actuality, the non-traditional goals of fixed asset management are closely related to the government's strategic planning, which places a heavy emphasis on the efficient use of resources, the disposal of surplus assets, or the use of capital assets in plans for community development.

Government describes the purposes as well as aims of their assets control to be strategic and public good. The United States General Services Administration (GSA), like a leader of the centralized government concerning management of public assets, describes its objectives of asset control as assisting national agency on national management of issues in fixed asset. The matters include asset management planning, management of inventory, as well as performance measurement; creating methods and programs to review agency conformity; supervising along with enhancing the Federal Real Property Profile (FRPP) along with the database of the government of centrally leased and owned properties; evaluating as well as inventorying performance of real property; making and encouraging secure, high performance places of work; plus create and executing rules to guarantee full successful exploitation of properties, suitable levels of investment in properties,

as well as discarding of excess real properties (General Services Administration, 2009). Furthermore, Government Accountability Office (2007) found that objectives of asset management are to support the strategic goals and missions of agency by way of using life-cycle cost benefit analysis plus utilizing commercial as well as public best practices and yardsticks. The Florida Department of Management Services, which is in charge of a small portion of the country's non-current assets, explains that its aim in managing assets is to establish accountability for public properties, facilitate physical inventories, comply with Florida state regulations, and provide for better exploitation of assets (Florida Department of Management Services, 2009).

In general, only a few local authorities have departments specifically dedicated to managing the buildings they possess (Hentschel & Utter, 2010). Local governments have a little amount of excess assets in addition to a modest income. Due to its uniqueness, local government places more emphasis on achieving traditional goals than on achieving non-traditional goals for asset management. Hentschel and Utter (2010) stressed that the goal of managing public assets is to achieve a balanced and efficient utilization of the portfolio of public assets in order to capitalize the most earnings at the least amount of expense when doing research on public asset management in the United States. Even though this target description relates to asset management at every level of government, it elucidates the very emphasis of local public property management.

Public asset management's objectives are to maximize the value of the non-movable assets that municipalities own and rent while minimizing the expenses related to using the property in order to provide services for government operations. From this viewpoint, there is little disparity between private and public asset management. The agencies of the government ought to try to be like their private corresponds with reference to techniques as well as strategies to achieve good management of public assets (Hentschel & Utter, 2010). These phenomena are similarly

experienced in developing countries where major purpose has been of public good hence little attention and management is given to the assets of the owned.

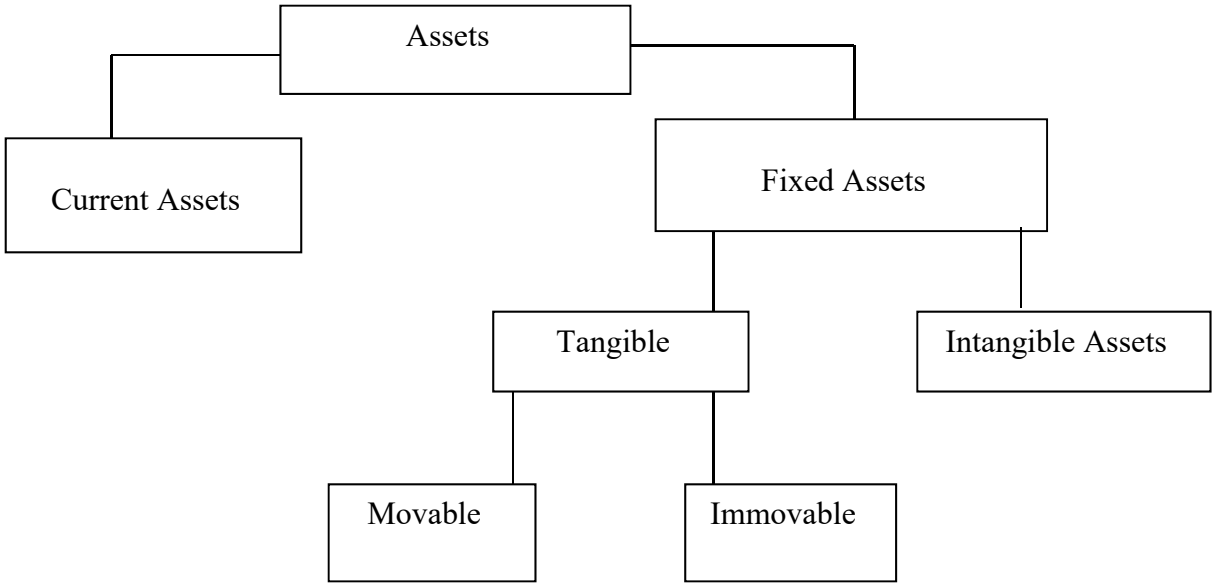
2.3 Public Asset Management

The discipline of public property management, or asset management, is the practice of managing public buildings, infrastructure, and assets. Public assets include tangible property like land and public buildings, as well as intangible assets like software, arts and antiquities, intellectual property, technical know-how, skill, and innovation. They also include public-related infrastructure like airports, bridges, waterways, electric grids, parks, ports, mass transit systems, schools, public spaces, railways, roads, waste systems, and water supply systems (Bever, 2011).

Assets should be discussed from a variety of angles. The International Accounting Standards Board (IASB) defines an asset from the perspective of accounting as a resource that is controlled by the venture due to prior acts and from which possible financial benefits are anticipated to arrive toward the venture. The Financial Accounting Standards Board (FASB) defines assets similarly, as potential future financial profits acquired or managed by a given entity as a result of past events or operations (The FASB Concepts Statement No. 6, Elements of Financial Statements, paragraph 25).

Assets are normally classified into physical (for instance, hard cash, equipment and real estate) and non-tangible assets (for instance, franchise, copyrights, trademark, patents, and trade names) in manner of physical matter. Physical assets, according to Viljoen (2010) may be more classified into impermanent properties that aren't attached to landed property and may be shifted as well as utilized after elimination (for instance, automobiles, as well as equipment), and permanent assets that can't be shifted or can't be utilized if removed).

Figure 2.1: Public Asset Classification



Source; (Viljoen, 2010).

From accounting standpoint, assets are classified into current assets (such as short-term investment, cash and cash equivalent, prepaid expenses, tax receivable, accounts receivable, as well as inventory), and fixed assets, such as lasting investments and non-current assets (for instance furniture, land, equipment, tools, infrastructure, water distribution systems, public housing projects, as well as buildings,) (Viljoen, 2010). Figure 2.1 recapitulates the categorization of assets.

Government gets assets in means dissimilar from industries in private sector. Government income is largely found by means of constitutional power whereas private industries obtain income from business of selling of services plus goods. On this ground, in public arena, a property is a public financial reserve that is acquired or managed by government in consequence of precedent proceedings as well as transactions, not letting out legal obligations. In general, public properties

are ways by which municipal functions to create communal goods as well as offer public services (Dent, 1997).

Governments at various levels or still governments at similar levels might have a range of collections of assets under its management. Assets in a government broad statement of financial position entail restricted cash plus cash equivalents, current assets, capital assets, along with long-term investment. In essence, a number of expressions are used to denote the importance of managing public assets, such as land property as in Federal Real Property Asset Management (FRPAM), real estate as in management of real estate, fixed asset as in financial statement, and real property as in management of real property. These expressions highlight dissimilar categorization of public assets as well as association of assets possessors. The term, property, emphasizes the associations among an asset and the title-holder(s) as well as non- title-holders. It verifies privileges of title-holder(s) to the asset but cancels out privileges of non - title-holders. On the contrary, the term property, highlights the financial value of an intangible or tangible thing that may create potential financial benefit. The word, estate, comprises of every asset one possesses or manages. By viewing it from a legal standpoint, it comprises a bigger reporting of monetary attention. Looking at various undertones of the expressions, realty as well as real estate might submit to similar physical unit, land plus houses or different substances fixed on the land for a permanent period of time, except with dissimilar predilection. Usually, realty, largely includes land along with every tangible item on top of, underneath, or fixed to the land whereas, real property, from public industry entails additional tangible items than those of, realty, for example hydroelectric projects, infrastructure, weapon systems, hardware as well as software of computer, and systems of waste distribution. The expression property asset to an extent is unclear phrase of preference since it mostly refers to real property, such as land and houses (Kaganova, Rutledge,

Ralevic, Markovic, Bolger, & Yurman, 2012) but it again highlights the nature of properties as a public resource, worth as well as gains.

In actual fact, non-current asset, occasionally termed as property, plant, and equipment, is frequently thought to be one and the same to fixed asset. Capital assets and fixed assets are both non-current assets in government accounting or financial reporting that cannot easily be converted into hard currency. They involve long-lasting, depreciation-prone, and non-depreciable assets. According to Government Accounting Standards Board (GASB) 34, capital assets are defined as all non-tangible and tangible assets that are used in business functions and have original functional operations that extend beyond a single reporting phase.

Accounting for capital assets is one of the most controversial issue. The most familiar groups of capital assets include land, works of art plus historical treasures, easements, equipment, buildings, vehicles, machinery, and improvements to land. Infrastructure assets for municipal entities must be reported as components of capital assets as of 1999, according GASB Statement 34. Drainage systems, lighting systems, communication systems, road networks, dams, and water supply and sewage systems are a few examples of infrastructure property. Governments make and execute various capitalization guidelines that put least amount of dollar ceilings to establish the precise items documented as capital properties. The ceilings differ as per governmental purposes, organizational size, as well as standards of value and duration of functional life (Ruppel, 2009).

From the angle of management, the entire non-current assets of the government may be categorized into 3 groups in manner of purposes: non-current assets for governmental utilization (for example, firehouses, warehouses, police stations, offices), fixed assets for social utilization (leisure facilities, public housing, health service facilities, parks along with school buildings), as well as

surplus fixed assets (Utter, 2001). According to Hentschel and Utter (2010), excess assets are non-key properties that are complementary or additional to the government's mission of providing services. Social-use properties and government-use properties are the center assets that the national and county governments manage and use to achieve their objectives of offering services. To manage each group of fixed assets and achieve its objectives, the government may adopt different policies and implement a variety of tactics.

According to Summerell (2005), county governments could improve the efficiency and efficacy of their service delivery by putting in place asset management mechanisms. This improvement could be made by cutting operating costs totally, reducing vacancy rates, improving delivery times, better managing value along with churn, and cutting moving expenses.

2.4 ICT Application in Public Asset Management

Several writers have recently examined the use of ICT in public asset management tasks and services, and their findings support growing ICT use in real estate and other public assets. In 1996, only 65% of local governments in New Zealand and 66% in England and Wales possessed electronic records of their public assets, according to Kaganova and McKellar (2006), citing Dent (1997). On a global scale, the situation was the same. Additionally, while ICT implementation is widely agreed upon among property management professionals, it is clear that in many cases, ICT adoption has not resulted in its full potential.

Furthermore, Grubisic, Nusinovic, and Roje (2009) stated that many local authorities still lacked asset registers that would have given them a true reflection of the total value of the assets owned or that were insufficient, making it challenging to monitor and control how public assets are used or misused despite living in an era of information technology and widespread computer use. For

instance, Washington, D.C., in the USA, had duplicate and inconsistent records of its building inventories as of 1997, as well as a sizable incomplete inventory of its in- and out-lease properties.

In order to keep a competitive edge over other professionals and the market, real estate practice in Australia adopted computerization and extensive use of ICT, according to the study of Peansupap and Walker (2005). According to Yusof (2013), better asset management systems lead to the optimization of asset utilization, which ultimately reduces costs.

In Nigeria, Oyetunji, Ojo and Oyetunji (2018) exploring factors for the exploitation of ICT in real estate and with a factor analytical experiment found out that infrastructure in technology, delivery of service, enhanced effectiveness as well as efficiency branding increased the employment of ICTs in the real estate industry of Lagos Nigeria.

There are notable adoptions of ICT in public sector organizations. Application of ICT ranges from basic office automation tools like word processing, spreadsheets to internet as well as on-line marketing. Property asset management systems are also now widespread. Additionally, valuation and development appraisals have also emerged. The section below presents asset management functions and services that can be performed using ICT and show how each function fits into the ICT parameter in public asset management.

2.4.1 Records Management

Records management, also known as records and information management, is a task performed by a corporation that is responsible for overseeing the management of information across all stages of its life cycle, from inception or receipt through final disposition. In order to do this, documents must be located, categorized, stored, retrieved, secured, tracked, and either destroyed or preserved

indefinitely (Association of Records Managers and Administrators (ARMA) International, 2013). Records management is defined by the ISO 15489-1: 2001 standard (ISO 15489-1:2001) as the area of management responsible for the competent and orderly management of the formation, reception, preservation, use, and disposition of records, not only the procedures for obtaining and maintaining evidence of information about business transactions and activities in the structure of records.

The records of an institution preserve aspects of institutional memory. The potential of records to be used again is crucial when determining how long to store them. Several are kept on hand as evidence of tasks, transactions, and judgments (Megill, 2005). Records management is a component of an institution's larger function in governance, risk management, and compliance, and it is primarily concerned with managing the confirmation of an institution's activities as well as the reduction or alleviation of risk associated with it (Tarantino, 2008). Current research demonstrates associations between records management and responsibility in governance (David, 2017).

Well controlled records are bases for good governance. This helps in both documenting the rules, transactions as well as tasks of governments and to offer a reliable basis of information to support accountability as well as decision-making. Numerous government operations that customarily depended on information derived from paper records have turn out to be partly or completely computerized. As governments move to an on-line environment, account in electronic type are offering the foundation for carrying out business, managing state resources, serving the public, shielding their own and others' rights, and measuring progress as well as outcome. Records management is more and more becoming technology dependant. It is imperative therefore to have idea means of evaluating the strengths plus weaknesses of records systems as well as establishing

whether they are competent of registering, preserving and offering access to records in due course (Dent & Bond, 2014).

Most current deliberations of technology will perpetually make reference to the effect of cloud computing. Conventionally, a firm's whole IT infrastructure was situated locally, denoting that all servers, data centers as well as storage were located on-site in a chosen room with cooling plus power. Cloud computing, merely put, is about permitting users inside an organization to get to software applications along with data storage by means of the internet, other than their hard drive. Cloud computing offers plentiful benefits organization including flexibility, distant use across numerous devices, low capital expenses, least maintenance as well as flawless upgrades (Ashioya, 2014).

Cloud-based property-management systems are property management systems that center all the property businesses in one system and make them accessible anytime, anywhere, from any device. They are user-friendly and interactive that enables efficient management of all business functions for professional property management in one system that is accessible anywhere where the property manager and tenants are connected to the internet. In addition, it provides an effective way to track the property for critical financial and reporting needs.

2.4.2 Land Management

The process of regulating the use and development of land assets (in both urban and rural contexts) is known as land management. Land resources are used for a variety of purposes, such as natural farming, eco-tourism initiatives, managing water resources, and reforestation. The effects of land management on terrestrial ecosystems can be either beneficial or detrimental. Misused land may deteriorate, produce less, and undermine natural equilibrium (Foley, Defries, & Asner, 2005).

The functions under land management include; survey and mapping, facilitation of land transactions, title deeds issuance, lease preparation, physical planning, cadastral data (data on ownership and use of land), and searches.

Geospatial Technologies are technologies connecting to the gathering or processing of data that is related to location. Audit Scotland (2009), in its recommendation to Audit Commission, suggested that Local authorities should adopt corporate approaches to land management, further suggesting a move toward a central database through a land information system. Geographical information systems (GIS) and land management information systems (LMIS) are excellent tools for using this type of information.

2.4.3 Survey and Mapping

Land surveying is the art, science, as well as profession of establishing the locations of points on the earth surface and determining the distances, directions, viewpoints, and heights between them. This data assists precisely generate maps and establish plot boundaries. The Kenyan county governments' land can be surveyed and mapped using geographic information systems (GIS).

A computing system for registering, preserving, querying, assessing, and presenting data that is geographically referenced is referred to as a "geographic information system." Data that is geographically referenced are information that depicts equally the position as well as distinctiveness of spatial attributes like parcels of land along with vegetation stands on the surface of the earth. Research indicates that GIS can help asset managers organize and spatially visualize space and how they can best use such space. This, in turn, can reduce the operational cost and enhancing efficiency by deploying the personnel and assets where they are really needed (Ralphs, 1998). A good example is Shanghai Municipal Council, it has integrated ICT in managing built

environment dubbed “shanghai digital space” In this program, wireless sensors are installed throughout the city to gather information on the usage of built space, transport, security, land development and environmental protection(Economist Intelligence Unit, 2010). The information collected is then kept on central database where it can be shared to various departments. The argument is also supported by Ndungo (2009) study model of Komarock estate GIS database. The model effectively offered an absolute and all-inclusive inventory of the entire houses and their features stored in feature tables. This was proof that the agent of the estate and property manager can be able to store all accounts in way that would make easy manipulation, quick querying as well as more imperative permit for bringing up to date of the records.

2.4.4 Land Transactions

Land transaction stands for the purchase, sell of, or other dealings with land, whether or not buildings, plant plus equipment, furniture along with fittings or other assets are contained in that transaction. Land information management system helps in land transaction activities. As stated by Kameri-Mbote (2016), land remains the most valuable possession of mankind and important asset of any nation. Therefore, management of any land information is vital. This is because land information has across-the-board significant effect on the economy of a country, because it makes possible land transactions, property taxation plus development planning as well as control, all of which turn into improved incomes for the government. In addition, effective management of land information enhances efficiency saving citizen a lot of time. Magondu, Kuria and Ngigi (2012) argue that the biggest challenge that government and local government face is ever increasing citizen demand. This does not augur well present Land Information Management system which is wasteful, lengthy and cannot support quick decision making (Kameri-Mbote, 2016; Magondu et al., 2012).

Block chain is also useful in land transaction as it helps in land registration in that the individuals involved in the land transaction easily access the information and facilitate the registration and transfer with less risks. Block-chain is a new technology that is gaining acceptance. This refers to a peer-to-peer disseminated electronic ledger that offers an unchallengeable time sequenced documentation of every transaction (block-chain) does not need trust between individuals and eases electronic "smart contracts". Block-chain may be utilized in tracking electronic assets, assets whose possession can be established electronically for instance land, derivatives along with shares, equities, currency as well as votes (Ministry of ICT, 2016; Mwaniki, 2018).

2.4.5 Physical Planning

Physical planning is an intended activity that uses the land utilization plan as a structure to suggest the most favorable physical infrastructure for an area or settlement, not limited to infrastructure for public services, economic activities, transport, leisure, as well as safeguarding of the environmental. Land information management system is used by central governments and county governments during physical planning. Kameri-Mbote (2016) contend that land information in Kenya consist of geospatial component that is geographical position of the land along with its area, including the non-spatial element, in the manner of the parcel characteristics, like details of the proprietor (address, name, and so forth), worth, as well as land utilization among others.

A land information system is an instrument for legal, managerial as well as financial decision making and a support in planning plus development. A resourceful LIS depends on the accessibility of excellent records, in absence management becomes costly (Obongo, 2003). Technically LIMS is land administration and a component of geospatial data management. (Geho, 2003) argues that the function of whichever land Information System (LIS) comprises data

gathering, data preparation, maintenance of storage, analysis as well as recovery of this land information.

Magondu et al. (2012) opined that LIMS that do not have interoperability with GIS have major drawbacks. For instance, they lack standardized approach of obtaining, documenting, and preserving land-related information changes and as a result tend to be inconsistent, inaccurate and costly. In addition, with different sources originating document it leads to replication among subdivisions and some time the data tends to be obsolete (Kameri-Mbote, 2016). For solving these issues Magondu et al., (2012) suggests use of a web based GIS system for managing land. This he notes that it would trim down or get rid of these challenges by offering an answer that includes a computerized index adopted in pulling geographic information out of the database.

2.4.6 Management of Property Rates

Property rating, again identified as tenement rating is the charge or tax imposed on the possessors or tenants of properties or apartment buildings which are rate able. It is the type of charge or levy which is imposed on properties. Computer-assisted mass appraisal (CAMA) is effectively used by central and local governments for property rating. A digitalized mass evaluation system is a computerized system for preserving property information, giving price to the property, informing possessors and making sure tax equity through standardized assessments. A decent CAMA system will carry out these tasks in an efficient and user-friendly way (Simons, 2004).

A review of literature reveals various valuation systems that have capability of real-time valuation analysis. In fact, available in various local authority are web based customer server application that may line with most general application. The system may be adopted for property estimation, to establish the deferred maintenance, condition evaluation, approximating outstanding service

life as well as prioritization of maintenance procedure. The gist of it is that it can be integrated with other application such as GIS and LIS. Example of this Real-time Asset Valuation Analysis(Newton, 2006a)

The large portfolio of property that local authority has can be very challenging when undertaking valuation. To leverage on these many local authorities employ mass appraisals. Keith and McCluskey (2004) describes mass assessment as the method of valuing a great deal of assets simultaneously using standardized processes. However, due to large amount of data that are collected, it makes sense to use computer in order to have greater precision and clarity therefore saving clients valuable time. Walt (2016) describes Computer Aided-Mass Valuation as the process of preparing assessments for a group of properties. With CAMA, the valuer carefully selects property and collects significant details on it and using regression the valuer is able to establish the power along with character of the correlation between one dependent variable (more often than not symbolized by Y) and a chain of other variables (identified as independent variables) (Babawale, 2013; Geho, 2003; Walt, 2016). The advantage of CAMA is that despite the saving on cost the models can help to make the data available for forecast with greater precision and clarity (Newton, 2006b).

2.4.7 Asset Tagging, Verification and Tracking

Asset tagging is the method of categorizing commercial business physical properties to more resourcefully and precisely categorize them for financial reporting, maintenance management, location trailing, as well as avoiding loss. Asset cataloging is employed for both non-current as well as current assets to offer a means to recognize individual properties all through their functional life. The authentication of properties means an investigation into the value possession

and title existence plus control the occurrence of any charge on the properties. Authentication is an auditing practice in which auditor satisfy self with the actual existence of properties and liabilities emerging in the financial statement. Therefore, verification includes substantiating the existence of the assets along with liabilities. According to a study by Kithinji (2015), the practice of trailing tangible assets involves either looking at the barcode labels attached to the items or using tags with a global positioning system (GPS), Bluetooth low energy (BLE), or radio-frequency identification (RFID) that communicate their position (Association of Records Managers and Administrators International, 2013).

Technological advances have enabled items or inventory to be tracked in ways that far exceed the functionality of a simple list. One of the most recent systems used to manage and regulate inventories is radio-frequency identification (RFID) tags and barcodes. This technology provides automatic inventory identification that is able to capture and record any transactions. With the uses of a barcode scanner or RFID reader, inventory can be located and automatically identified (Kitheka, 2012; Kithinji, 2015). Barcode on the other hand are a visual device decipherable representation of information about the thing to which it is fixed. Barcodes are employed for classification, handling, repossession as well as storage of products in stores and warehouses (Kitheka, 2012).

2.5 Factors that Hinder Application of ICT in Public Asset Management

Governments at various points possess a big range of properties and rent an enormous number of parcels of private real assets to be utilized by the public (Kaganova & Nayyar-Stone, 2015). The properties are utilised and controlled to add to the stipulation of public services as well as the accomplishment of assignments of government agency. From the standpoint of the management,

public property management requires to give suitable services that agencies require to accomplish their missions. Conversely, management of public property asset ought to offer effectual services at the lowest cost while make the most of the price of the asset assortments under management. Nonetheless, from the real practice of managing government property assets, a variety of concerns are impediments to accomplishing the successful installation of ICT in management of public asset.

County governments hold enormous assets. Despite this potential, there is management deficiency with little attention which have affected their effectives and in turn service delivery. The problem is further compounded by fragmented style and under deployment of ICT. Disintegration of asset management denotes missing of vital authority to properly manage the properties. Public non-current asset management is executed by a lot of public agencies, Kaganova, *et al.,* (2012) found that each of which utilizes as well as manages a little segment of the entire properties that national government possesses and rents. The findings of the survey display that in comparison with the realty in the private quarter, management of public properties is substandard in centralization of operations (Simons, 2004). Beneath disjointed control, government misses the benefit of the advantage of size. In the meantime, when renting real assets from individual proprietors, a single agency might be positioned at an underprivileged state compared to an institution as representative for numerous agencies. Additionally, proficiency in property control is almost not assured. At the time government is deficient in unitary approaches, guiding principles, along with rules, disjointed management might result in shortages in helping agencies, therefore causing it to be difficult to accomplish the purposes and goals of management of public non-current properties.

Awa, Ukoha and Igwe (2017) citing Zhu et al. (2003) opine that organizational context has significant role in adoption of technology. Organization context here being referred as a

descriptive measure, which between others, entail accessibility and ability in employing resources, scope of company, social influences, size of the organization and loose resources, culture plus structural arrangements, sources of information as well as channels of communication, centralization levels along with managerial beliefs.

According to Kirkwood (2004), the restriction of ICT's fundamental potential in real estate is a result of economic, political, educational, financial, cultural, along with privacy and access concerns. Review of available literature reveals four major challenges to adoption of ICT in pubic asset management. These include policies, organizations culture, technological changes, Financial and Skills. Similarly, insufficient policies, institutional as well as legal frameworks at the devolved county and national levels of government has been cited as major hindrance to ICT adoption (Ministry of ICT, 2016).

Literature reveals that organizational culture is major hindrance of ICT implementation in county. The study stressed that Skills were of the real challenge underlining the point made by Peansupap & Walker (2005). Crowston et al. (2001) suggests that it’s very imperative for organization to decide its worker’s skills as well as knowledge of ICT since those knowledge or earlier experiences might influence decisions of the organization in assuming ICT by organization processes. The modifications to organization plus industry systems and procedures, occurring in part from how person employees adopt ICT in their work, cause alterations in organization-level results like performance or productivity. Without a doubt, these results are over and over again the motivation for the decision to put into practice the ICT in the first place.

Despite the immense value of the asset, commercial real estate assets are grossly undermanaged, according to a research assessment conducted by Massachusetts Institute of Technology in 1987.

The fact that many commercial real estate managers do not maintain enough information on their real estate properties and lack adequate knowledge of the technology is one of the most significant characteristics pointing to this under-management.

According to a study by Mulwa (2015), the adoption of ICT for service delivery is positively correlated with manpower, financial resources, personal traits of County management, and infrastructure.

According to Markus, Dutta, Steinfield and Wigand (2008), adoption of ICT is influenced by the expected outcome. For instance, the study revealed that increased occurrence of ICTs in a variety of sectors may become troublesome, causing people and organizations to either adapt or become obsolete. This hinders implementation of such technologies.

Information and Communication Technology requires increasing investment (Oyetunji et al., 2018). This in turn requires adequate funding which include cost of hardware, software, training and other services that are associated with the technology. Studies suggest that most national government allocate insufficient financial resources to ICT, this is cascaded down to county government level. On the other hand, affordability of such technology tends to hinder implementation of latest technologies.

Oyetunji, Ojo and Oyetunji (2018) advancing the works of Abd-Majid et al., (2012) postulate that contractual as well as legal challenges such as data ownership plus holders of the copyright, the legal soundness of contracts, as well as electronic signatures, verbal culture along with traditions especially where information is distributed in person, lack of shared principles for exchange of information, missing of financial resources for ICT procurement, lack of ICT staff competencies, low connection of the internet, high charges on internet services, lack of real estate ICT principles,

high cost of knowledge and hardware about the cost and financial benefits of ICT investments to be the main barrier to adoption of ICT.

South East European Development Center (2012) study analyzed that in adopting property management software it should be correctly incorporated within the existing information systems of the organization and every systems connected to property have to be included or linked. According to the report, the geographical information system (GIS) and accounting management approach are among the most crucial modules that should be incorporated into the systems. These strategies will need to be logically connected by a standard real property coding method and system. For each property, the "accounting double entry system" may assign a financial recognition number that corresponds to the inventory number. Unquestionably, the greatest solution for managing both municipal property as well as individual property portfolios is a fully integrated system.

Insufficient funding for the execution of the automation approach, strong resistance from employees who were predestined to be the executing agents but preferred the status quo, insufficient office space, and inadequate training on the new Enterprise Resource Planning software system were also mentioned by Wandera (2012) in a case study conducted by Kenya Medical Research Institute (KEMRI).

Concerns about the infrastructure and availability were expressed in additional material that was reviewed. For instance, Kirkwood(2004a) claimed that building a strong infrastructure to handle remote operations takes time. In addition, systems created for managing asset is comparatively small in number as well as scope, and are normally expensive hence the reason for not implementing. Peansupap and Walker (2005) note security concerns in technology diffusion.

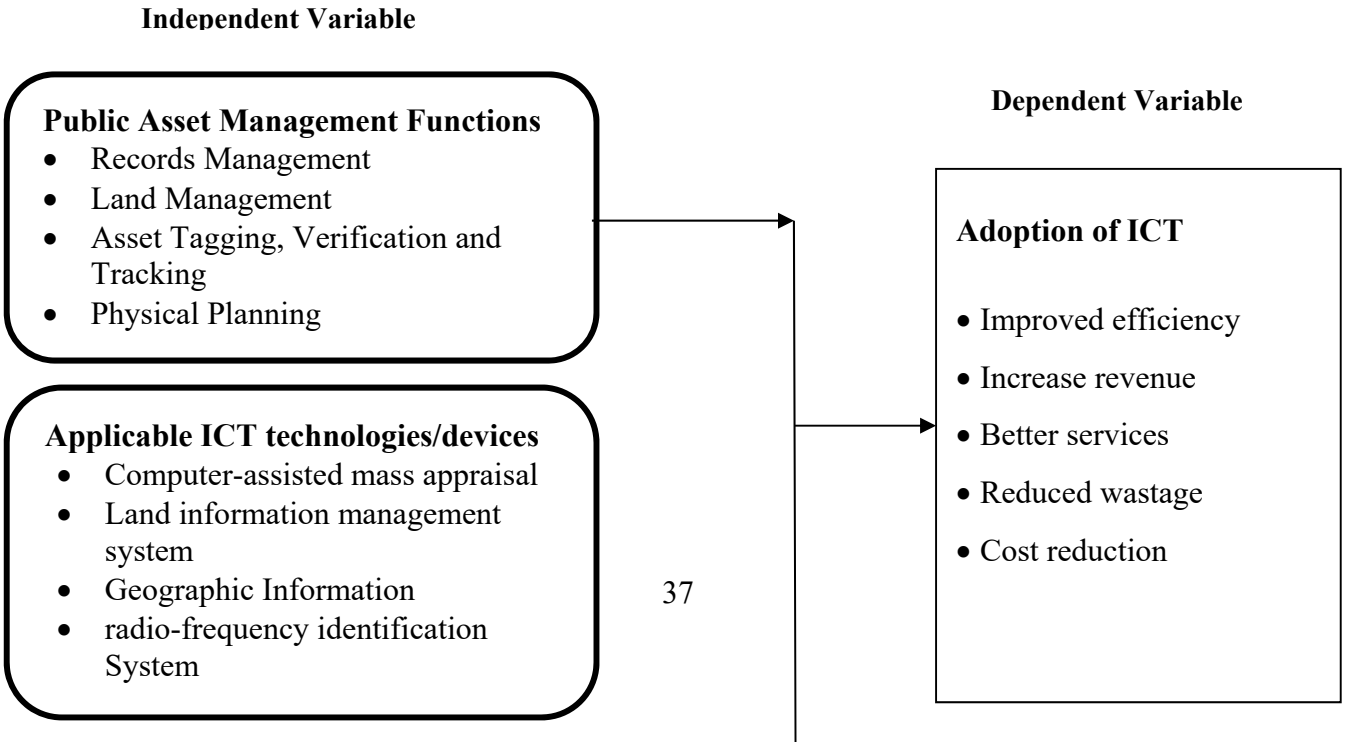
With increasing advancement of technology, security of data through cybercrime and cyber-security vulnerabilities remains a major challenge.

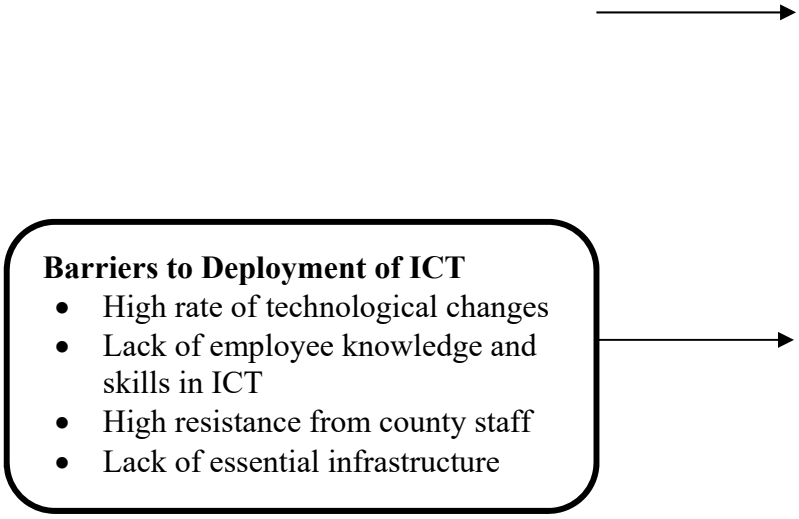
2.6 Conceptual Framework

According to Mugenda & Mugenda (2003), a conceptual framework is a model that hypothesizes the relationships between the concepts being studied. The foundation for this study was guided by a number of literature reviews where it was found that particular factors influenced the use of ICT in public asset management. The county government of Meru is hampered in its efforts to adopt and implement ICT in asset management by a number of factors, including but not limited to functions, technologies, and devices, which are regarded as independent variables, and other elements such as technological advancements, employee knowledge and skills, infrastructure, and organizational culture, which are regarded as intervening variables. The Meru county government's use of ICT in asset management is indicated by cost savings, decreased waste, higher revenue, improved services, and increased efficiency.

The conceptual framework to be adopted for this research survey examines the extent of ICT adoption in public asset management by identifying the asset management functions in county governments, specific ICT technologies that have been employed and factors hindering the deployment of ICT in public asset management as shown in diagram in Figure 2.2

Figure 2.2: Conceptual Framework





Source: Authors Construct, 2020

2.7 Summary

The literature on the use of ICT in public asset management has been evaluated in this chapter with an emphasis on asset management, public asset management, the use of ICT in public asset management, and factors that prevent the effective use of ICT in management. The research approach used in this study is covered in detail in the following chapter.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The research methodology gives a detailed overview of the steps taken to conduct the study. It describes the research design, study population, sampling strategies, sample size, data collection methodologies, and data analysis techniques, as briefly detailed in the sections below.

3.2 Research Design

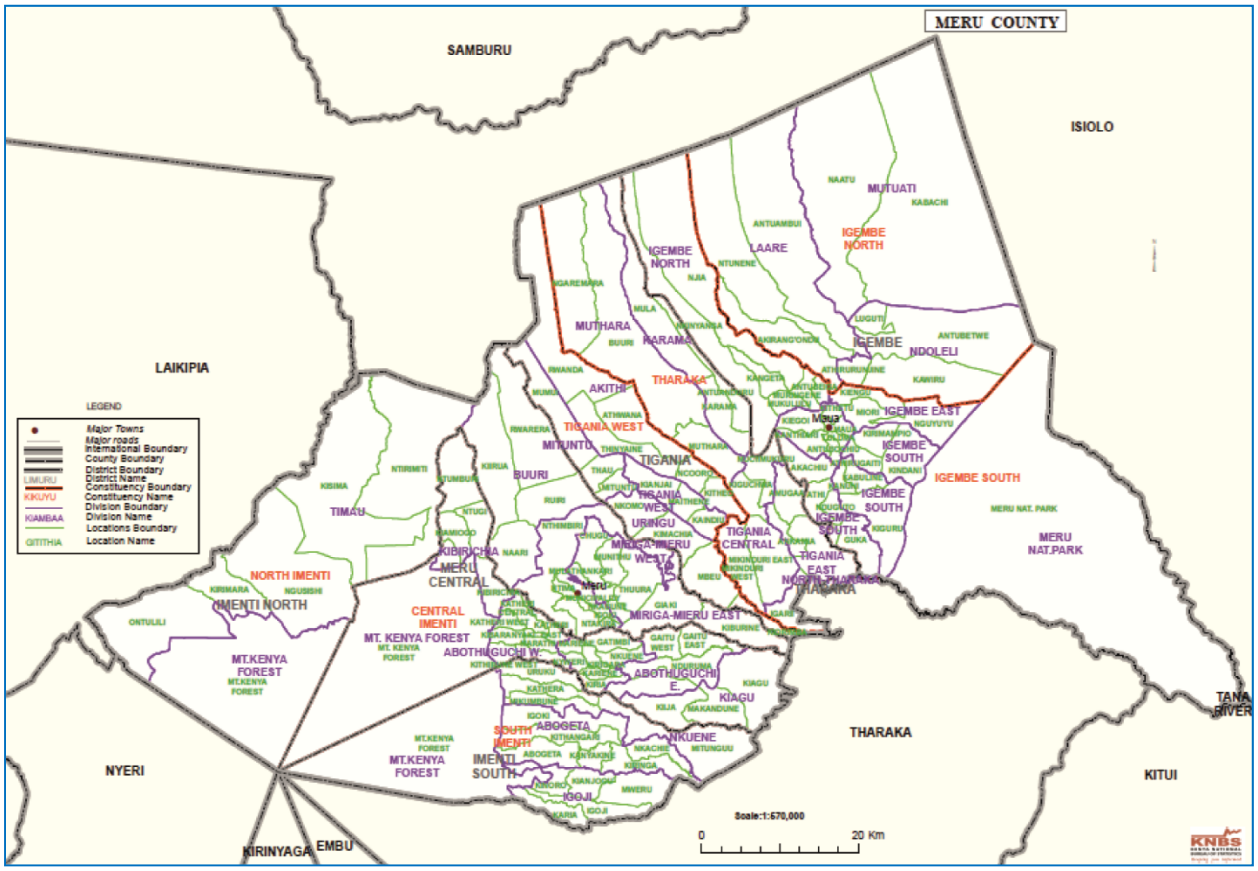
The term, ‘research design’, is employed in a range of ways by researchers. It is known as a master plan, outline, and even as a progression of research duties as well as activities. Research design in clear terms is a plan of the techniques and courses of action that is used by researchers to bring together and examine the data required to accomplish the research goal (Creswell, 2014).

The study employed a case study research technique. The case study technique offer the opportunity to undertake a rigorous analysis of the phenomenon under investigation, and therefore, Meru County was chosen as case study to give an exhaustive examination of the extent of application of ICT in county governments’ public asset management. Meru County Government in Kenya was selected as the case study area because of its recent efforts to deploy ICT technologies prompted by Auditor general reports of 2018 which revealed inadequate asset management practices in the County, which if addressed could offer useful lessons for other Counties in Kenya.

3.3 The Case Study Area

Kenya's 12th county, Meru County, is found in the erstwhile Eastern Province. It shares boundaries with the counties of Isiolo to the north, Tharaka/Nithi to the east, Nyeri to the south-west, and Laikipia to the west. Buuri, Igembe North, Igembe South, Igebe Central, North Imenti, South Imenti, Central Imenti, Tigania East, and Tigania West are the nine constituencies that make up Meru County. In view of the 2019 population census, Meru County population rests at 1.55 million individuals (KNBS, 2019). The populace of the county is predicted to increase to 1.57 million individuals by 2020 considering 2.1% rate of growth. It has a yearly rate of productivity of 5.1% which provides more information on the high populace increase. Meru County again has a high prospective of agricultural production. Considering this, Meru County government requires enhancing effectiveness in delivering service in the parts of health particularly family planning, modern technologies in agricultural as well as education production by introducing effective technology in asset management.

Figure 3.1: Map of Meru County



Source: Kenya National Bureau of Statistic (2019)

The functions of counties in the devolved governance structure include; agriculture and biological assets, county health services, county public amenities, trade development plus regulations, county transport, county planning along with development, including statistics, land mapping as well as survey; and housing, and carrying out of particular guidelines for national government on environmental protection as well as natural resources (Institution of Economic Affairs, 2010). Deployment of ICT is necessary to enhance efficiency in county government functions and operations including asset management.

3.4 Target Population

A populace as affirmed by Banerjee and Chaudhury (2014) is a complete set regarding which a number of information is required to be instituted. The population therefore comprises all the individuals and organizations that make up the study space (Kothari & Garg, 2014). The target population for this study comprised of 459 Meru County government employees working in departments that deal with the county government asset management.

3.5 Sampling Design

According to a research by Cooper and Schindler (2014), sampling design reveals how instances are chosen for observation and, as a result, charts how samples are drawn. The sampling frame, sample size, and sampling procedure are all parts of the sampling design.

3.5.1 Sampling Frame

A sampling frame, according to Saunders et al. (2016), is a comprehensive list of every component of the population. Following their approval to engage in the survey, staff from Meru County asset management departments and reputable property management firms provided the sample frame for this study. Among the obligations is to not reveal names of persons, such a file has not been captured in the research study. The sampling frame is made up of 459 employees responsible for asset management from the ten departments of Meru County Government.

3.5.2 Sampling Techniques

According to Saunders et al. (2016), a sampling technique is the name or other identification of the particular procedure used to choose the sample's entities. In sampling, there are two categories

of techniques. The probability technique of sampling is used first, followed by the non-probability technique.

Under probability sampling techniques, each population member has an equal chance of selection through a random selection mechanism. Some of the characteristics of probability sampling techniques are that there are existing statistical bases for estimating population characteristics and it is possible to estimates with a level of precision. This level of precision includes the sampling error possibility (Patton, 2015). Simple random sampling, where everyone in the universe has an equal chance of being selected for the sample, is one sort of probability sampling (Zikmund et al., 2013). Systematic sampling is a different form of probability sampling technique. With this technique, the researchers randomly or regularly choose people or components of the population. The interval, also referred to as the sampling interval, is calculated by dividing the population's size by the ideal sample size. It might also lessen mistakes. The likelihood of error would increase with technique complexity. Another type of probability sample is a stratified random sample, where a simple random sample is chosen from each stratum after the population elements have been divided into overlapping groups called strata. Following this, a systematic random sample is taken from each group. Last but not least, cluster sampling involves selecting basic random samples, and each sampling unit is made up of a collection, cluster, or component parts of a larger sample (Johnson & Onwuegbuzie, 2014).

Non-probability sampling, according to Kothari and Garg (2014), does not aim to select a random sample from the population of interest. Rather, the determination of which components are included in the sample is made using prejudiced techniques. It is nearly always not possible to randomly sample the entire population due to time, financial, and manpower constraints, hence it is commonly preferred to use a different sampling technique, the non-probability

sampling technique. A non-probability sample, in contrast to probability samples, is not the result of a random selection procedure. Elements in a non-probability sample are more often than not selected on the ground of their ease of access or by the purposive individual verdict of the researcher. There are different non-probability sampling techniques. These include snowball sampling, where participants in the research study identify additional participants for the same study, quota sampling, where samples are chosen from subgroups, convenience sampling, where the most convenient samples are used, and purposive sampling, where samples are selected using subjective means (Cooper & Schindler, 2014).

Purposive sampling was utilized to choose the Meru County sample units, which included nine qualified property management firms and 10 divisions of the Meru County government. The study used a mixed non-probability and probability sampling approach. The researcher was able to respond to the questionnaire most effectively by focusing on specific qualities of a population that were useful to focus on. This sampling technique was chosen as it assisted in ensuring that the research units are well symbolized. A simple random sampling method was thereafter used in every stratum to pick 219 employees of the county government. This technique was selected as it enabled the researcher to capture responses across the strata as recommended by Patton (2015). Sequential numbers were assigned to the entire list of managers from each organization. Based on the sample size and sample fraction determined for each organization, matching random numbers were generated by a computer program. The managers chosen as study participants were those whose sequential numbers matched the computer-generated random numbers.

3.5.3 Sample Size

A sample size is a crucial component of any empirical study since it allows for the creation of inferences about a population (Creswell, 2014). A representative sample is one in which every member of the population has an equal and mutually limited probability of being chosen; a sample is a group of respondents chosen such that they reflect the entire population as reasonably as probable (Banerjee & Chaudhary, 2014). In quantitative study, an adequately big sample size is likely to create statistically specific quantitative estimations. A bigger sample may produce more precise outcome but extreme responses can be expensive and hence important research needs an understanding of the statistics that move sample size verdicts. According to Saunders et al. (2016), no sample is completely perfect and the lower the margin of error, the more confidence there is in the sample. Merely put, a confidence level depicts how certain you might be that your findings are precise, while the margin of error reveals the range the study findings would fall between if our confidence level is believed to be true. Standard surveys tend to have confidence levels of 95% and margin of errors of 5% (Smith, 2013).

If the population is manageable and small, a census can be conducted; on the other hand, if a related study is presented, a sample size similar to that of the research could be used; if no similar survey is immediately available, there are numerous alternatives available to scholars, including establishing size through present tables, simple equations, or sample size calculators (Cooper & Schindler, 2014). For the purposes of this study, the Yamane (2001) formula is used to determine the sample size within each purposively selected county government department and professional property management companies in Meru County. The Yamane (2001) formula was deemed suitable for use in this study due to two factors: first, its ease of use; and second, empirical evidence demonstrating this formula's widespread acceptance for calculating sample sizes in many contexts. It is obvious that no sampling circumstance can guarantee absolute precision, and the range of

predictable precision mistakes that are permissible does not just include errors of precision of 0.01, 0.05, and 0.1. For this research investigation, the precision error is 0.05.

A confidence level of 95% was deemed enough for the purposes of this research study because the population consisted of county departments and professional asset management organizations operating in Meru County. This allowed for a margin of error of just 5% when calculating the sample. An accuracy error of 0.05 is widely regarded as acceptable in the field of social sciences. The formula is as follows, as shown:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n stands for the sample size

N represents the population

e denotes the margin of error– 5%.

The sampling frame for the survey was homogenous, so the sample size for each department and professional property management company was determined using the Yamane (2001) algorithm. Five of the nine specialized property management firms in Meru County and 214 workers working in asset management departments made up the target demographic. The process used to determine the survey's sample size is described below.

n = [459]/(1+{459}(0.05^2)) = 213.73;Rounding =214 respondents; plus 5 professional property managers. This gives a total of 219 respondents.

3.6 Data Collection Methods

Data collection according to Saunders, et al., (2016) entails assembly unrefined information for the reason of refining it into a meaningful shape by means of scientific practice of data analysis. Data can comprise original or primary data which comprises data that is gathered first hand by the researcher at the source where the research problem lies or it can be secondary data which comprises data that was collected previously and the data therefore already exists in published or other form (Kothari & Garg, 2014). Primary information, according to Cooper and Schindler (2014), is information that has been collected specifically for a study topic. Primary data has the benefit of being directly customized to your study requirements. The use of questionnaires, interviews, surveys, focus groups, ethnographies, case study documents, and reports are a few of the methods that can be utilized to gather data.

In order to collect information from the participants, the study used structured questionnaires, case study materials and reports, and an interview guide with open-ended questions. The interview guide was given to the qualified property managers while the feedback form was given to the county employees. Bader, Bauer, Kroher and Riordan (2016) define a closed or structured questionnaire as a quantitative technique of survey which requires low levels of involvement by the researcher and enables reach out to high numbers of respondents (the individuals who answer the questions). The questionnaire is the preferred data collection tool because of its ease of use, its ability to obtain responses from a large number of respondents, and also because research has shown that questionnaires are considered to be precise, effective and efficient (Hasan, 2014). Great care is exercised in designing the questionnaire to ensure that valid and reliable data is collected. Further, 5 point Likert scales are used to draw information from respondents on the level to which they agreed with statements in the questionnaire. A Likert scale is a psychometric

feedback scale primarily adopted in questionnaires to attain the preferences of the participants or level of conformity with a statement or group of statements. Likert scales are a not comparative scaling method and are unidimensional (just determine a single trait) in nature. Likert scale is preferred because it enabled the researcher to get responses that explained their opinions to a deeper level than could be understood with simple yes or no type of questions. According to Harpe (2015), scales help transform data into quantifiable forms and therefore facilitate data analysis. These features of Likert scales made their use preferable. Case study documents and reports are obtained from the county government departments dealing with asset management. Interview guide is desired for the reason that it structured the discussion and yet gives liberty of receiving comprehensive information from the participants (Bryman, 2016).

3.7 Research Procedure

The research process is a succinct account of all the steps taken in the survey for the purpose of explanation (Cooper & Schindler, 2014). The steps are explained clearly and in enough detail so that a new researcher can understand them and repeat the study after them. The strides for the research process are; getting permission, doing a pilot test, testing reliability of the tool, testing the validity of the tool, administering the tool in the field, gathering the data, preparing the data for analysis, and lastly discussions, conclusions as well as recommendations are made based on the findings of the study. Ethical considerations are adhered to at all times.

3.8 Data Analysis Methods

Data analysis entails examining, checking, verifying, along with purifying data with the intention of finding out information that assists the survey construct helpful conclusions as well as recommendations from the study findings (Cooper & Schindler, 2014). The survey collected

quantitative information using a questionnaire as the data collection instrument. Data is organized, coded and put into data analysis instrument, SPSS version 23, was used to facilitate data analysis. Descriptive statistics are employed in calculating the measures of central tendency not limited to the percentile distributions, frequency, standard deviation, as well as mean. The diagnostic tests are performed to establish the suitability of fitting the proposed statistical models on the data. Inferential statistics are achieved by conducting tests by means of statistical analytical software and the findings are used to deduce the relationships present between the dependent and independent variables.

3.9 Summary

This chapter covered the research methodology that was presumptively used to carry out this research survey. The case study methodology used in the study was chosen as the best research strategy. The study's 219 participants—214 county employees and 5 professional management businesses in Meru—were covered in the chapter. The sample for the study was chosen using the Yamane (2001) formula. The chapter also covered the study process and listed structured questionnaires, interview guides, documents, and reports as the tools chosen for data collection. Finally, the chapter provided examples of the techniques employed in the data analysis. The outcomes and conclusions of the data analysis are covered in Chapter 4. Tables and figures are used in the chapter to present the results.

CHAPTER FOUR: DATA ANALYSIS AND PRESENTATION OF FINDINGS

4.1 Introduction

Details on the study's data presentation, analysis, and conclusions are provided in this chapter. There are four different sections in this chapter. The first section sought demography information from the respondents, the second section sought response on asset management functions that are performed by ICT, the third section sought to know ICT technologies and devices used by respondents and the last section sought responses on factors that hinder adoption and implementation of ICT in asset management. Descriptive statistics were generated to explore the extent of deployment of ICT in public asset management with special reference to assets owned by County Governments in Kenya. Descriptive statistics undertaken were frequency, percentage distribution, mean scores.

The total number of participants in a study is the response rate. There were 219 questionnaires given in total, and 188 of them were filled out and returned. This represented a response rate of 85.8%, which is higher than the non-bias response rate of 85% and was considered sufficient for a case study research design (Wiseman, 2003).

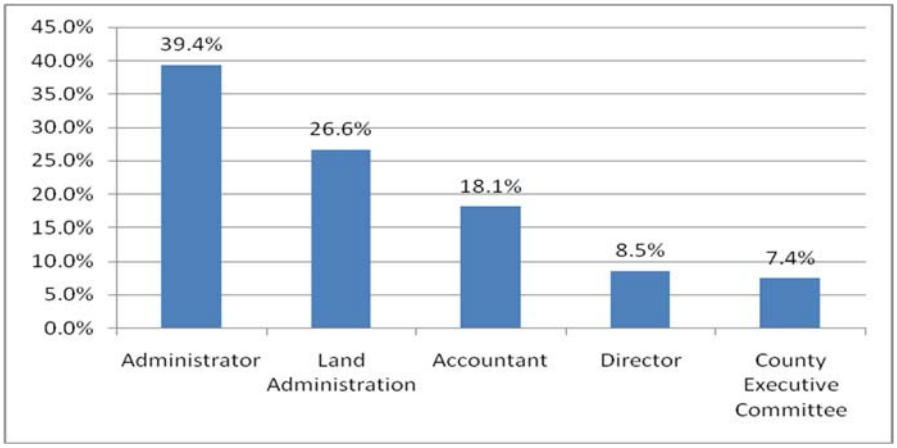
4.2 Characteristics of Respondents

The demographic profiles of the respondents are included in this section of general information. The general information was crucial to the study because it provides insight into the respondents' personalities. Results of the respondents' demographic information as derived from the research tool (questionnaire) are presented. The information sought included; respondents position/title, age bracket, gender of the respondents, work experience and work department.

4.2.1 Respondents' Job Position

The purpose of this study was to identify the job titles of those employed by Meru County Government. According to the findings, 39.4% of respondents identified as administrators, 26.6 % as land administrators (land surveyors, valuers, and physical planners), 18.1 % as accountants, 8.5 % as directors, and 7.4 % as members of the county executive committee. The study's conclusions indicate that the majority of those employed by county governments are in administrative positions. The study's findings are shown in Figure 4.1.

Figure 4.1: Respondents' Job Position

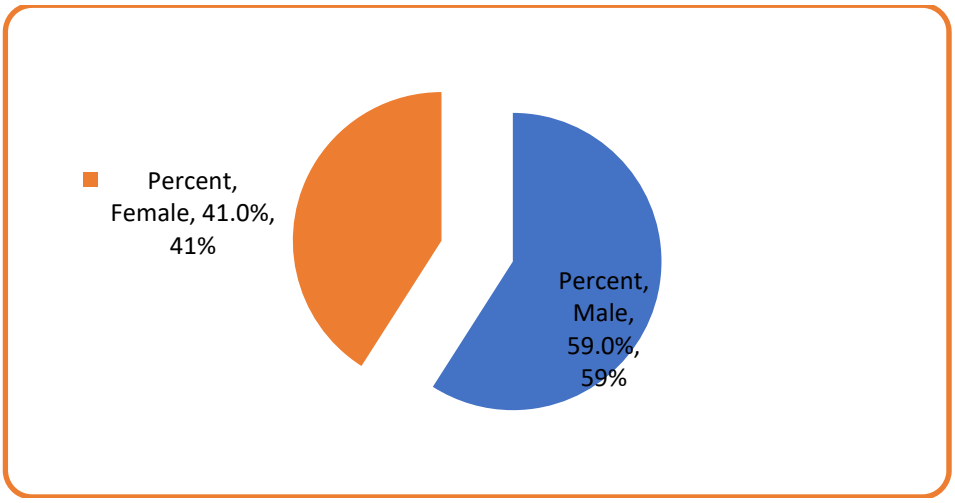


4.2.2 Gender of the Respondents

In order to show the gender distribution of employees at Meru County Government, this study required respondents to specify their gender. The study findings revealed that 59 per cent of the employees working with the County Government of Meru were male thus representing the majority, while 41% were female. The result of the survey depict that the many of the county staff are male workers. This finding helps the study to proportion the county staff in terms of

gender so as to explain the deployment of ICT in public asset management. Figure 4.2 shows these results.

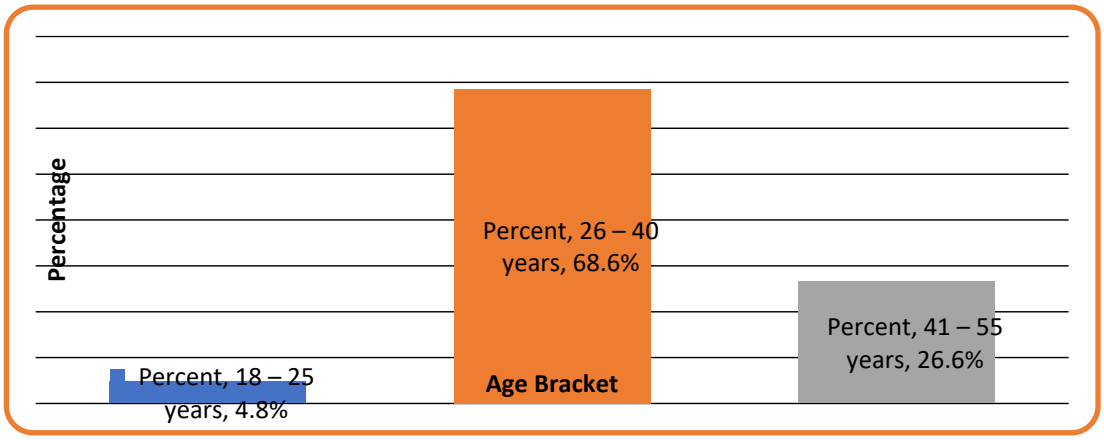
Figure 4.2: Gender of the Respondents



4.2.3 Age Distribution of the Respondents

The responders to this study were prompted to provide their age ranges. This was crucial to the study since it showed what age range the employees in the County Government of Meru were. According to the study's findings, 68.6% of respondents were between the ages of 26 and 40, 26.6% were between the ages of 41 and 55, and 4.8% were between the ages of 18 and 25. According to the study's findings, the majority of the staff members of the Meru County Government are between the ages of 26 and 40.

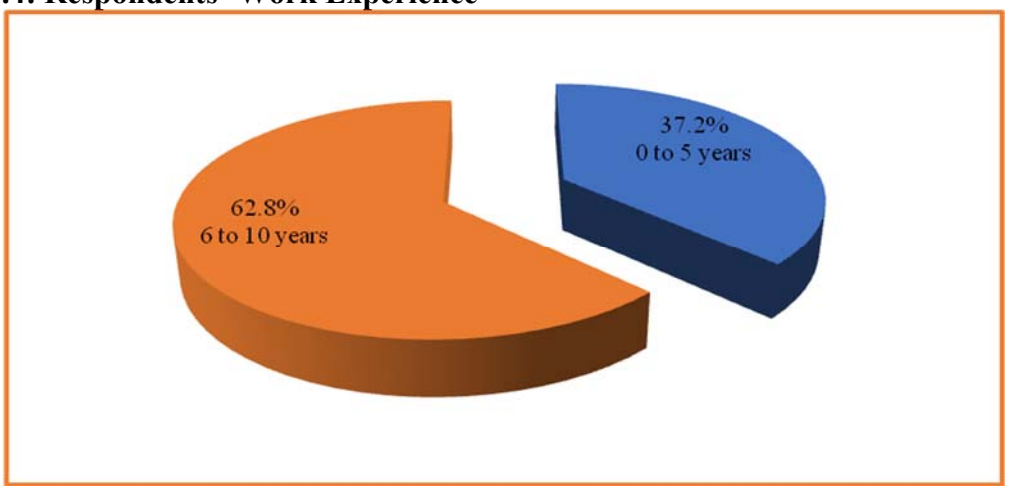
Figure 4.3: Age Distribution of the Respondents



4.2.4 Respondents' Work Experience

This study sought to analyze the work experience.

Figure 4.4: Respondents' Work Experience



The respondents' job experience was helpful to this study because it showed how long county employees had been employed by the Meru County Government. According to the findings in figure 4.4, 62.8% of the respondents had worked for a company for six to ten years, while 37.2% had worked for the county government for up to five years. According to the study's findings, the majority of respondents had spent six to ten years working for the Meru County Government.

4.2.5 Respondents' Work Department

The study in Figure 4.1 shows the respondents' work department. The study results show that procurement is highly represented at 17 per cent followed by employees working in the office of the governor by 14.4 per cent, then finance department by 11.7 per cent. The department of housing and urban development is represented by 10.6 per cent followed by public administration at 8.5 per cent and education at 8.5 per cent. The study department of agriculture, legal, trade, lands and public service are least represented by 3.7 per cent each. The findings of the study are illustrated in Table 4.1.

Table 4.1: Respondents' Work Department

Work Department		
	Frequency	Percent
Land, Housing and Urban Development	27	14.3%
Procurement	32	17.0%
Public administration	16	8.5%
Office of the Governor	27	14.4%
Finance	22	11.7%
Education	16	8.5%
Tourism	8	4.3%
Legal	7	3.7%
Agriculture	7	3.7%
Trade	7	3.7%
Public Service	7	3.7%
Sports	12	6.4%
Total	188	100.0%

To summarize on the demographic information, this survey results establish that the a lot of the participants working with Meru County Government were administrators, male employees are more represented, and that majority of employees aged between 26 to 40 years. This study finding also revealed that majority of the employees at Meru County Government have worked with the county government for 6 to 10 years and that the majority are from procurement department. The

study findings imply that work departments can easily be used to deploy ICT in the county governments and use the technology to manage the county assets.

The next section presents findings on the asset management functions, and which is the first independent variable of the study.

4.3 Identifying Asset Management Functions Performed with ICT in Meru County Government

This study sought to identify asset management functions that are currently performed with ICT technologies and potential areas of application of ICT in public asset management. The study had nine parameters that measured asset management functions. In this section, the study presents descriptive statistics; percentage and mean scores.

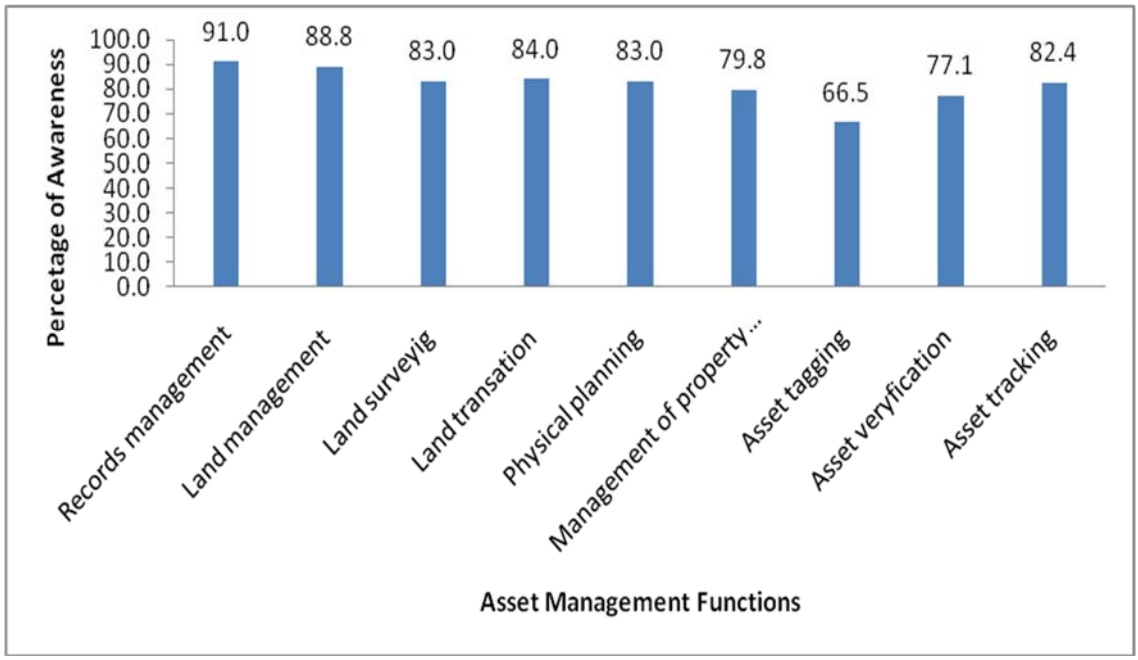
To assess the extent to which asset management functions are performed with ICT, respondents from Meru County government were asked to identify the asset management functions that are currently performed with ICT technologies and potential areas of application of ICT in public asset management. The functions were grouped into nine types namely; record management, land management, land surveying, land transaction, physical planning, property rates management, asset tagging, asset verification, and asset tracking. The study findings are demonstrated in Table 4.2 and well shown in Figure 4.5.

Table 4.2: Asset Management Functions

Asset management functions and areas of application	No	Not Sure	Yes	Percentage of Agreement
Records management is automated to manage the information of the County	13	4	171	91.0
Land management is automated to manage the use and development of land resources	8	13	167	88.8
Land surveying is automated to help accurately create maps and determine plot boundaries	23	9	156	83.0
Land transaction in the county is computerized	21	9	158	84.0
The county uses technology in its physical planning to propose the optimal physical infrastructure	28	4	156	83.0
Management of property rates are automated	25	13	150	79.8
Asset tagging is automated to efficiently and accurately identify county assets	42	21	125	66.5
Asset verification is computerized to help in identifying the ownership and possession of the asset	29	14	145	77.1
Asset tracking is automated to help in tracking county physical assets	15	18	155	82.4

The study investigated the existence of the asset management functions that are currently performed with ICT and their area of application. From the findings of the study, it is well indicated that most respondents (91%) agreed that record management, as asset management function, is more automated and manages all sort of information of the county. This is followed by land management (88%) which is automated to manage the use and development of land resources.

Figure 4.5: Asset Management Functions



The study also finds that the last asset management function that respondents are aware of as presented in Figure 4.5 is asset tagging that efficiently and accurately helps in identifying assets of the county government. This is followed by asset verification that helps in identifying the ownership and possession of the asset of the county.

The next section helps in identifying the specific ICT technologies and devices that have been deployed in asset management functions.

4.4 Identifying the ICT Technologies and Devices

The study sought to identify the specific ICT technologies and devices that have been deployed in the asset management functions. The study sought information from five elements of ICT technologies and devices. Under this variable, the study presents descriptive statistics; percentage, and mean scores.

To investigate the level of awareness of the deployed ICT technologies and devices, respondents were asked to identify the specific ICT technologies and devices that have been deployed in the asset management functions. Geospatial technologies, geographic information systems (GIS), land information systems (LIS), block chains, and land information management systems (LIMS) were among the categories of ICT technologies and gadgets.

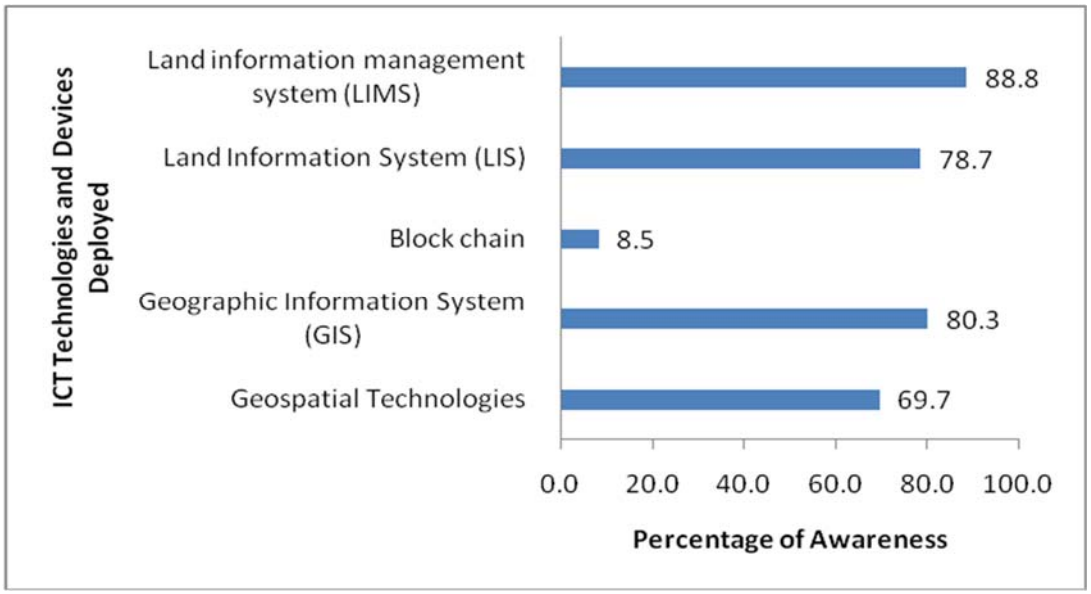
The results of the study in Table 4.3 demonstrate that 88.8 per cent of the respondents agreed that land information management system (LIMS) is deployed and helps in managing land information, followed by geographic information system (GIS) (80.3%) that helps in surveying and mapping.

Table 4.3: Deployed ICT Technologies and Devices

ICT Technologies and Devices deployed	Not Deployed	Not Sure	Deployed	Percentage of Awareness
Geospatial Technologies is deployed in land management	32	25	131	69.7%
Deployment of Geographic Information System (GIS) assists in survey and mapping	15	22	151	80.3%
Block chain is deployed and used in land transaction	172	0	16	8.5%
Deployment of Land Information System (LIS) is helpful in data acquisition	22	18	148	78.7%
Land information management system (LIMS) is deployed and helps in managing land information	14	7	167	88.8%

The study findings also showed that none of the respondents agreed that block chain technology that helps in land transaction matters is deployed in the county government. This is graphically exhibited in Figure 4.6.

Figure 4.6: ICT Technologies and Devices Deployed



The next section covers factors that hinder deployment which is a third independent variable of the study that measures ICT deployment.

4.5 Identifying the Factors that Hinder Deployment of ICT

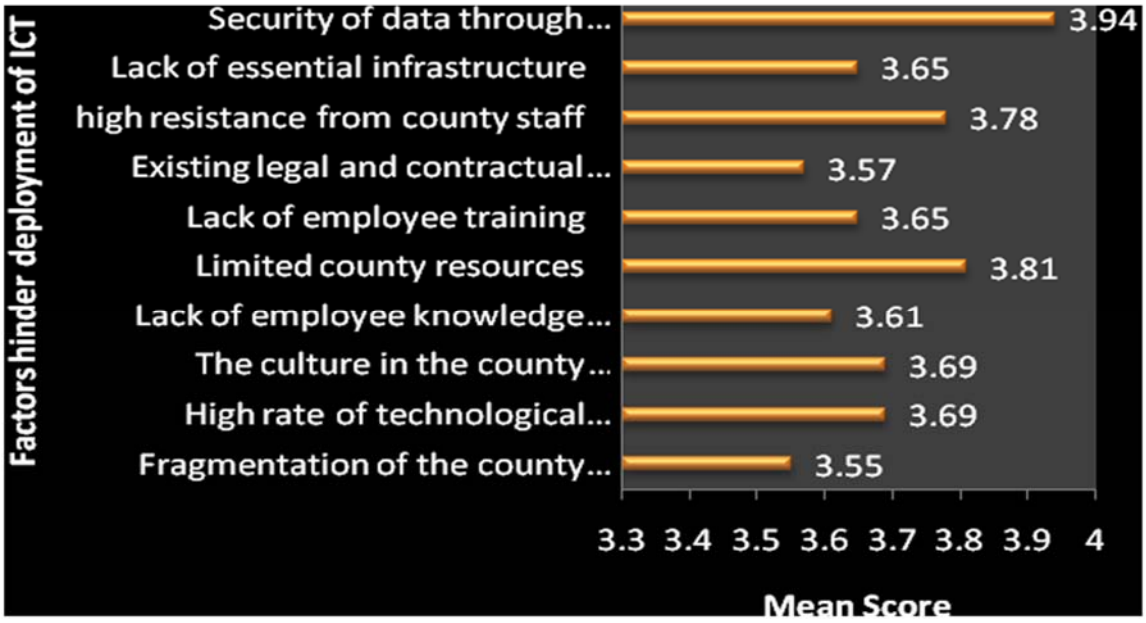
The study sought to identify factors that hinder the deployment/implementation of ICT in management of county public assets in Kenya. The study had ten parameters that measured the factors. In this section, the study presents descriptive statistics in terms of mean scores.

The mean scores for the parameters were calculated and the highest mean scare represented the factor that mostly hinders the deployment of ICT while the lowest mean score represent the factor that least hinders ICT deployment for asset management.

Table 4.4: Factors that Hinder Deployment of ICT

Factors that hinder implementation of ICT	Mean
Fragmentation of the county government asset management	3.55
High rate of technological changes	3.69
The culture in the county government is major hindrance to ICT implementation in the county	3.69
Lack of employee knowledge and skills in ICT	3.61
Limited county resources	3.81
Lack of employee training	3.65
Existing legal and contractual issues	3.57
high resistance from county staff	3.78
Lack of essential infrastructure	3.65
Security of data through cybercrime and cyber-security vulnerabilities	3.94

Figure 4.7: Factors that Hinder Deployment of ICT



With a mean score of 3.94, the study in Table 4.4 reveals that the security of data through cybercrime and cyber-security vulnerabilities constitute the greatest obstacle to the use of ICT in the administration of county public assets. Limited county resources rank second in terms of

difficulty, while significant staff resistance ranks third, with a mean score of 3.81. According to the study's findings, current legal and contractual concerns, which came in second with a mean score of 3.57, and fragmentation of county government asset management, which came in third, present the least difficulty in asset management. Figure 4.7 does a good job of showing this.

According to the findings summary under the heading "problems that restrict deployment," the majority of respondents concur that these factors significantly impede the use of ICT for asset management by the Meru County government. The entire chapter is summarized in the following section.

4.6 Summary

The chapter, according to the data collected, has provided results and findings about the deployment of ICT in public asset management with special reference to assets owned by County Governments in Kenya. Characteristics of respondents; job title, age, gender, work experience and work department of the respondents were analyzed. The study findings identified asset management functions that are currently performed with ICT technologies and potential areas of application of ICT in public asset management. It also identified the specific ICT technologies and devices that have been deployed in those functions. The chapter also identified factors that hinder the deployment/implementation of ICT in management of county public assets in Kenya. Chapter five on the other hand provides discussions, conclusion as well as recommendations of the research.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The study aimed to explore the extent of deployment of ICT in public asset management with reference to assets owned by County Governments in Kenya. The following specific objectives guided the project:

a. To identify asset management functions that are currently performed with ICT technologies and potential areas of application of ICT in public asset management.

b. To identify specific ICT technologies and devices that have been deployed in those functions.

c. To identify factors that hinder the deployment/implementation of ICT in management of county public assets in Kenya.

The above objectives were converted into research questions so as to help the researcher answer specific questions while conducting the study.

5.2 Summary of the Major Findings

5.2.1 Asset Management Functions Currently Performed with ICT

The objective aimed at identifying asset management functions that are currently performed with ICT technologies and potential areas of application of ICT in public asset management. The study found that records management, land management, land surveying, land transaction and physical planning are among the major asset management functions that are undergoing automation as

they are not fully automated. Records management is automated at 91%, land management at 88.8%, land surveying at 83%, land transaction at 84% and land planning at 83% automation.

5.2.2 Specific ICT Technologies and Devices Deployed

The second objective of the study aimed at identifying the specific ICT technologies and devices deployed in asset management functions. The study revealed that land information management system (LIMS) that helps in managing land information is deployed at 88.8%, followed by geographical information system (GIS) that assist in surveying and mapping, is deployed at 80.3%. The study revealed that block chain technology that helps in land transaction is not deployed in the County Government of Meru.

5.2.3 Factors that Hinder the Deployment/Implementation of ICT

The survey's final goal was to determine the factors that make it difficult to adopt or use ICT for the administration of county public assets in Kenya. The study discovered a number of obstacles preventing the use of ICT in the administration of County assets. The highest challenge that hampered the smooth deployment of ICT was identified as data security due to cybercrime and cyber-security vulnerabilities, with a mean score of 3.94. Limited count resources came in second with a mean score of 3.81. The survey also discovered that, with a mean score of 3.78, the county staff's strong resistance made it difficult to implement ICT in the management of county public assets. The survey also showed that, with a mean score of 3.55 and 3.61, respectively, fragmentation of the county government asset management and a lack of personnel knowledge and skills provided a moderate obstacle in using ICT in management of county public assets.

5.3 Methodology Adopted

The study employed a case study research methodology with both quantitative and qualitative data. The case study method offers a thorough examination of the problem under research and makes it easier to draw conclusions and comprehend the phenomenon being studied. Meru County Government in Kenya was chosen as the case study area due to the county's shortcomings in asset management methods as noted in the research's secondary data and the auditor general's report. 219 county government officials who were part of the survey's sample group. This survey used self-administered questionnaires, an open-ended interview guide, an examination of secondary sources, and reports from the Meru County government to collect pertinent information from the participants. There were 219 questionnaires given in total, and 188 of them were filled out and returned. This represented a response rate of 85.8%, above the non-biased response rate of 85%, which was considered sufficient for a case study research design (Wiseman, 2003). The study used percentage and mean score descriptive statistics. The research output and results were displayed using both figures and tables.

5.4 Conclusions

The study concludes that asset management functions in the Meru County government that are in the process of automation include; records management, land management, land surveying, land transaction, and physical planning. According to the report, the ICT tools and technologies used by the government of Meru County for asset management functions are geospatial technologies, geographic information systems (GIS), and land information systems (LIS). The study concludes that security of data through cybercrime and cyber-security vulnerabilities is a major challenge for the county to adopt effective asset management technology. This results from a lack of crucial

infrastructure that would support the adoption and application of technology in asset management. The study also comes to the conclusion that ineffective ICT deployment is hampered by the county government's asset management being fragmented.

5.5 Recommendation

5.5.1 Recommendation for Improvement

The study recommends Meru County government to fully automate records management, land management, land surveying, land transactions and physical planning. This according to the study will help to effectively and efficiently manage county information regarding the assets owned. According to the study, ICT devices and technologies are crucial for managing the sizeable volume of information related to asset management; as a result, it is advised that county governments install efficient information management systems that will help users create and maintain documentation for the asset management function. Meru County government should invest in modern and sophisticated ICT technologies and devices that will help in effective performance of asset management functions. The study recommends county governments to make sure that its asset management functions are not as fragmented as it was found to be. Employees should be trained on effective asset management system to enhance their knowledge and skills and facilitate adoption of advanced technology in asset management. Governments in each county should make investments in the necessary infrastructure to promote the adoption and use of technology in asset management. This would improve data security by reducing cyber-security flaws and cybercrime, which are still key obstacles for the county to implement useful asset management technology.

5.5.2 Recommendation for Further Research

The study's primary focus was on assets controlled by County Governments in Kenya with a view toward determining the level of ICT deployment in public asset management. The analysis was limited to one county government (Meru County Government). It is advised to conduct additional research to examine the outcomes when the same topic is extended to counties other than Meru County government. This study serves as a catalyst for future researchers to investigate variables that can improve efficient ICT deployment in asset management.

5.6 Summary

Section 5.2 of the chapter contained a summary of the findings, while Section 5.3 described the technique used, Section 5.4 reached a conclusion, and Section 5.5 offered recommendations. Additionally, the chapter offered suggestions for new fields of study.

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APPENDICES

Appendix One: Participant Consent Form

UNIVERSITY OF NAIROBI

We kindly request your participation in a research study to examine the scope of ICT deployment in public asset management, with particular emphasis on assets controlled by County Governments in Kenya.

The aim of this study is to identify asset management functions currently carried out with ICT technologies and potential areas of ICT application in public asset management. It also aims to identify the specific ICT technologies and devices that have been deployed in those functions and factors that prevent the deployment or implementation of ICT in management of county public assets in Kenya. Therefore, to be questioned, you must be a public employee employed by Meru County Government.

If you agree to participate in this survey, I'll provide you a feedback form to fill out. Prior to the researcher obtaining consent, each participant will be informed of the significant risks and advantages of participating in the study.

Your comments will be treated in strict confidence. The information will be kept secret and only the researcher will have access to it. If the survey is made public, the information you provided won't be included in a way that makes it likely to identify you.

Participation in this poll is entirely optional. Those questions that you are uncomfortable answering may be skipped. You are free to withdraw at any time if you decide to participate.

You have the right to ask any question you want about this survey or your participation in it at any time before, during, or after the survey.

After reading the aforementioned details, I received answers to my questions. I agree to participate in the survey.

Your signature _____ Date _____

Signature of researcher _____ Date _____

Name of researcher _____

Appendix Two: Debrief Form

We appreciate your participation in this survey. The survey's objective is to investigate the extent of ICT deployment in public asset management, with particular emphasis on assets controlled by Kenyan county governments.

Your contribution will help the researcher to comprehend the guiding principles prepared regarding asset management functions that are currently performed with ICT technologies and potential areas of application of ICT in public asset management, determine the specific ICT technologies and devices that have been deployed in those functions, and identify factors that hinders the deployment/implementation of ICT in management of county public assets in Kenya. If you feel any uneasiness on account of questions offered in this survey, please feel free to get in touch with the researcher by means of below details.

Mobile Number: +254722335964

Email: mwitinjohn@gmail.com

Kind regards,

John Mwiti

Appendix Three: Introduction Letter

John Mwiti

P.O BOX,

30197 - 00100.

Nairobi, Kenya

TO: MERU COUNTY SECRETARY

RE: RESEARCH DATA COLLECTION ON THE DEPLOYMENT OF ICT IN PUBLIC ASSET MANAGEMENT WITH SPECIAL REFERENCE TO ASSETS OWNED BY COUNTY GOVERNMENTS IN KENYA

I am a student undertaking Masters at the University of Nairobi, in **ARTS IN VALUATION AND PROPERTY MANAGEMENT**. I am now participating in a research study titled "***DEPLOYMENT OF ICT IN PUBLIC ASSET MANAGEMENT WITH SPECIAL REFERENCE TO ASSETS OWNED BY COUNTY GOVERNMENTS IN KENYA***".

The county managerial and administrative staff of the Meru County Government are the target audience for this study. I kindly ask you to take a few minutes out of your jam-packed schedule to complete the questionnaire that is attached. It should only take you 15 to 20 minutes to do this. Your assistance will help me gather the necessary data for the successful completion of my program, and I anticipate that the survey's findings will be helpful to Kenya's county governments as well as policymakers who are considering using ICT to manage public assets, particularly those belonging to county governments in Kenya.

Any information provided here must definitely be for academic purposes and will be treated with the utmost discretion.

Thank you for your support on the affirmed issue.

Yours Sincerely,

John Mwiti

Appendix Four: Questionnaire for Meru County Government Officials

1. SECTION ONE: DEMOGRAPHIC INFORMATION

1.1 Please affirm your title or position? _____

1.2 Age category? Kindly tick (√) one.

18 – 25 years	☐	41 – 55 years	☐
26 – 40 years	☐	Over 55 years	☐

1.3 Gender of respondent? Kindly tick (√) one.

Male ☐ Female ☐

1.4 Please show how long you have been working in County Government _____

1.5 Which department are you working in? _____

2. SECTION TWO: ASSET MANAGEMENT FUNCTIONS

The functions of asset management that are now carried out using ICT technologies are evaluated in this section, along with possible ICT applications in asset management for public use.
Please indicate how strongly you disagree or agree with the following assertions by checking the corresponding box in the appropriate column.
Use a scale of 1 to 5, where 1 represents "Strongly Disagree," 2 "Disagree," 3 "Neutral," 4 "Agree," and 5 "Strongly Agree".

2.1	Asset Management Functions	SD	D	N	A	SA
		1	2	3	4	5
1.	Records management is automated to manage the information of the County					
2.	Land management is automated to manage the use and development of land resources					
3.	Land surveying is automated to help accurately create maps and determine plot boundaries					
4.	Land transaction in the county is computerized					
5	The county uses technology in its physical planning to propose the optimal physical infrastructure					
6	Management of property rates are automated					
7	Asset tagging, verification, and tracking is automated to efficiently and accurately identify county assets					

8. Kindly state other asset management functions performed at the county governments?

_____
_____
_____
_____
_____

3. SECTION THREE: ICT TECHNOLOGIES AND DEVICES DEPLOYED IN ASSET MANAGEMENT FUNCTIONS

Section three examines the specific ICT technologies and devices that have been deployed in asset management functions.

1. Kindly identify the ICT technologies and devices that have been deployed for asset management functions in Meru County government?

_____

_____

_____

_____

Please check the appropriate column to show how much you agree or disagree with the following statements. Use a scale of 1 to 5, where 1 represents "Strongly Disagree," 2 "Disagree," 3 "Neutral," 4 "Agree," and 5 "Strongly Agree".

3.	**ICT Technologies and Devices**	**SD**	**D**	**N**	**A**	**SA**
		1	**2**	**3**	**4**	**5**
1	Geospatial Technologies help in land management					
2	Geographic Information System (GIS) assists in survey and mapping					
3	Block chain is useful in land transaction					
4	Land Information System (LIS) is helpful in data acquisition					
5	Land information management system (LIMS) help to manage land information					

4. SECTION FOUR: FACTORS THAT HINDERS THE DEPLOYMENT OF ICT IN ASSET MANAGEMENT

In Kenya, section 4 addresses barriers to ICT deployment and execution in county public asset management.

Please check the appropriate column to show how much you agree or disagree with the following statements.

Use a scale of 1 to 5, where 1 represents "Strongly Disagree," 2 "Disagree," 3 "Neutral," 4 "Agree," and 5 "Strongly Agree" (SA).

4.1	**Factors that hinders the deployment of ICT**	**SD**	**D**	**N**	**A**	**SA**
		1	**2**	**3**	**4**	**5**
1.	Fragmentation of the county government asset management					
2.	High rate of technological changes					

3.	The culture in the county government is major hindrance to ICT implementation in the county					
4.	Lack of employee knowledge and skills in ICT					
5.	Limited county resources					
6.	Lack of employee training					
7.	Existing legal and contractual issues					
8.	high resistance from county staff					
9.	Lack of essential infrastructure					
10.	Security of data through cybercrime and cyber-security vulnerabilities					

11. Kindly identify other factors that hinder the deployment of ICT?

_____

_____

_____

_____

THANK YOU

Appendix Five: Interview Guide

I sincerely appreciate you taking the time out of your busy schedule to meet with me right now. I am keen to be taught from your view regarding the deployment of ICT in public asset management with special reference to assets owned by the Meru County Government.

Questions

1. Kindly identify the asset management functions that are currently performed with ICT technologies in Meru County government?

2. To your understanding, which specific ICT technologies the county government has deployed in asset management?

3. Kindly discuss the factors that hinder the deployment of ICT in management of the county public assets?