SUPPLY CHAIN PROCESS DIGITALIZATION AND THE EFFECTIVENESS OF PROCUREMENT TRANSACTIONS AMONG PARASTATALS: A CASE OF THE KENYA RURAL ROADS AUTHORITY

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DECLARATION

This research project is my original work and has not been submitted or presented to any other institution of learning for any academic award

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I thank Almighty God for uncountable blessings and also for making my dreams come true. I also thank my project supervisor Dr. Thomas Ombati for the promptness, guidance and encouragement during every stage of this project preparation.

DEDICATION

I wish to dedicate this work to my family for prayers and moral support.

TABLE OF CONTENTS

LIST OF TABLES

ABBREVIATIONS AND ACCRONYMS

AI	Artificial Intelligence
AR	Augmented Reality
GDP	Gross Domestic Product
IT	Information Technology
NAPM	National Association of Purchasing Management
PPIP	Public Procurement Information Portal
PPRA	Public Procurement Regulatory Authority

ABSTRACT

Public procurement is a crucial market in any economy since it often uses a significant amount of a country's public income. Public procurement procedures are essential to the efficacy and efficiency of development expenditures. Public organisations have continually had to encounter business-related problems like acquiring timely and highly reliable data and information, data-processing in the course of business transactions, storage of data using convenient means, and also retrieval mechanisms that enable prompt decision-making and adequate management control of the organisation. This study aimed to assess the influence of supply chain process digitalization on the effectiveness of procurement transactions among parastatals. The study was anchored on the following theories; digital efficiency theory and the technology acceptance model theory. An interview guide was used as a data collection instrument targeting 20 senior employees of the Kenya Rural Roads Authority. The data collected was analyzed using content analysis. The study established data consolidation, staff digital proficiency and public procurement information portal has a positive and significant effect on the efficiency of the procurement transactions. It was established that data consolidation has made the data and information available, timely and easily accessible, staff digital proficiency has enabled the organization to reduce the time spent to perform tasks, reduce error and increase the productivity and public procurement information portal has enabled the organization to retrieve summarized information easily and interact with various stakeholders through the internet platform. The study concludes that supply chain process digitalization has a positive effect on the efficiency of procurement transactions at Kenya Rural Roads Authority. The study recommends that the management of the Kenya Rural Roads Authority (KeRRA) to effectively prepare employees through training before implementation of technologies in the organization and that policy makers in the National Treasury and Public Procurement Regulatory Authority should increase the amount of budgetary allocation at KeRRA for the implementation of the current supply chain process technologies and training of the employees. Future studies should focus on different approach rather than case study and the use of statistical approaches to draw the conclusion of the study.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Public procurement procedures are essential to the efficacy and efficiency of development expenditures. Typically, public spending is converted into services primarily via public purchases of commodities, services, and construction projects (Mahmood, 2010). According to estimates, public procurement accounts for around 18.42% of the global economies' Gross Domestic Product (Mahmood, 2010). According to Schapper and Veiga Malta, public procurement is a crucial component of a country's public administration systems that combines the financial and monetary systems with economic and social aims or results (2011). Generally speaking, it is seen as a wise and effective method of forming contracts between the government and private entities or individuals (Schooner, 2012). It is also often used to further a nation's socioeconomic development goals, such as the economic advancement of reserved and preferred groups (Arrowsmith, 2010).

Nearly every aspect of planning, program management, and public budgeting is impacted by the strength and viability of public procurement, which also has a significant impact on the governance and delivery of public services. Therefore, public procurement is a crucial market in any economy since it often uses a significant amount of a country's public income (Schapper & Veiga Malta, 2011). Public procurement has always received a lot of interest across the globe, mostly due to its magnitude (Callendar & Mathews, 2000). According to Schiavo-Campo & Sundaram, developed countries typically spend roughly 20% of their Gross Domestic Product (GDP) on public procurement whereas underdeveloped countries spend substantially more, over 50% of GDP (2001). Many nations, both developed and underdeveloped, have implemented procurement reforms that include laws and rules. The recent transition from paper-based to digital e-procurement is one of the most significant procurement innovations.

One of the significant initiatives towards the digitalization of procurement processes in parastatals in Kenya came by way of the Public Procurement Information Portal (PPIP) which was implemented by Public Procurement Regulatory Authority (PPRA). Aside from this, individual public organisations have made internal efforts aimed at achieving an optimal level of automation of the procurement process. Over the recent past, user acceptance has improved basically at a similar pace as the rise in the number of suppliers who have been empowered to use the e-procurement systems. When more and more products as well as suppliers are updated on the e-procurement systems, the system users have little reason to try and bypass the systems in place in a bid to remain within the old ways of procuring which were prone to abuses and malpractice.

System users however still report that certain factors have continued to slow down the uptake of systems by users which include inadequate spending categorisation in the e-procurement systems, non-standardised purchase requirements and procedures, inconsistent supply nodes categorised by regions, and also a lack of management goodwill or management-driven policy adoption to enhance compliance to the e-procurement systems. Organisations that have managed to implement best practices in e-procurement have enhanced system user adoption for many years, and their managers have played a key role of becoming the champions and drivers of the digitalization of procurement. This lays the groundwork for a successful switch to e-procurement.

Digitalization, according to Podlogar (2006), is the process of using internet and communication technologies to make some procedures simpler, boost production, and enhance efficiency. According to the research mentioned above, process reengineering has some characteristics that are closely related to process simplification, such as awareness of technological opportunities, the capacity to achieve process effectiveness, readiness for e-procurement collaboration, satisfaction with and favorable experiences with e-procurement, sharing, and environment-changing responses. These categories of criteria investigate how

easily company data may be processed in relation to the procedures required for carrying out the whole procurement process. Amaratunga and Baldry (2002) proposed that performance is a key driver for improving the quality of services, while its absence or the use of inappropriate means can act as a barrier to change and lead to the deterioration of the procurement function, in order for an organization to shift its focus and become more competitive.

According to Artley & Stroh (2001), Amaratunga & Baldry (2002), and CIPS Australia, organizations and enterprises lacking performance metrics in their processes, procedures, and strategies display lower performance in addition to higher levels of customer dissatisfaction and employee turnover (2005). According to Batenburg & Versendaal, measuring the effectiveness of the procurement function will provide firms with advantages including cost reduction, improved profitability, guaranteed supply, quality improvements, and competitive advantage (2006). Making a realistic evaluation of the risks that are most likely to arise in each given procurement is an excellent method to lower them. Some of the most common dangers may be reduced or eliminated with diligent planning and knowledge (Artley & Stroh, 2001).

1.1.1 **Supply Chain Process Digitalisation**

Supply chain process digitalisation is the use of digital technology to alter a company model and offer new revenue and value-producing options. There has been a significant shift towards digitalisation by organisations in recent years, primarily for reasons of efficiency and effectiveness. Computers and other digital technologies are better able to handle repetitive tasks than human beings, and can also eliminate human error. Nevertheless, it is vital to note that computers don't have reasoning and creativity, which are only possible with human resources. With the shift to digitalisation, organisations are also trying to digitise procurement transactions as much as possible. This can be achieved by centralising data, or what is otherwise known as data consolidation. When organisations make use of central databases that provide procurement information, they are able to optimise the quantity of dealers and decide whom to bargain with in terms of pricing and supply conditions.

The Government of Kenya has implemented a Public Procurement Information Portal (PPIP) which provides this information for government ministries and parastatals (Robert, 2003). The PPIP helps to optimise the number of suppliers, their pricing structures and the conditions for supply. Digitalisation can be measured in terms of how much the organisation is using databases to centralise and consolidate data and information, how proficient the staff is in the use of ICT systems, and how well the organisation has implemented the PPIP. In order to assess the level of digitalisation within an organisation, one can measure how much the organisation is making use of databases in centralising and consolidating data and information. Furthermore, the proficiency of staff in the use of ICT systems can be evaluated, as well as how well the organisation has implemented the Public Procurement Information Portal (PPIP). By taking these factors into account, it is possible to get a clear idea of the level of digitalisation within an organisation and how effective it has been in making use of digital technologies to improve procurement processes.

1.1.2 Procurement Transactions Effectiveness

Procurement transactions effectiveness is a measure of how well a company's procurement department is performing in terms of processing and completing transactions. This performance metric can be used to assess the efficiency of the procurement department and to identify areas where improvements can be made. In the risk assessment, hazards related to the purchase of products will be determined, and management methods and backup plans will be devised. When the contractor is seen to be the best person to handle the risks, sometimes the risks will be shifted to him. However, it is thought that sharing risks between the two parties at all phases of the procurement process is the best way to manage risk (Caldwell, Roehrich and Davies, 2009).

The acquisition of items with the proper quality and necessity depends on accurate and thorough specifications. It outlines the requirements for the contractor or supplier, and he is

expected to submit a bid in accordance with those requirements. Depending on the nature of the purchase, specifications may be simple or complicated (Caldwell, Roehrich and Davies, 2009).

The requirements should be written in a way that allows for the most competition feasible while not favoring any one contractor or supplier over others in order to guarantee fair and unbiased competition. Specifications must be given in general terms without including brand names, model numbers, catalogue numbers, or other similar designations (Caldwell, Roehrich and Davies, 2009). The effectiveness of procurement transactions can be measured by volume of transactions, accuracy of transactions and by speed of transactions.

1.1.3 Kenya Rural Roads Authority

KERRA is a state-owned corporation mandated to provide guidance in construction, maintenance and management of the rural road network in Kenya. The parastatal is overseen by the Ministry of Roads and was founded in 2009. Similar to many of the newer parastatals, is it fairly autonomous. It was created through the Kenya Roads Act of 2007 and was mandated to continue developing, constructing and maintaining the rural road network estimated to be 130,000 kilometres out of the total of over 160,000 kilometres of road network existing in Kenya (Kenya Infrastructure Directory, 2019). The improvement of the roads sector has become a key pillar of the current government's programs. This is because the government expects that infrastructure will play a major role in realising the social and economic goals entrenched in the Kenya Vision 2030.

Kenya's public sector is essential to the efficient provision of services and tasks that are essential to a country's economic operations (Kobia and Mohammed, 2006). This principle forms the justification for the government's directive that all parastatals operate under performance contracts in order to improve their performance. The KeRRA started rolling out performance contracts in the financial year 2009/2010. These mode of oversight has enjoyed a

lot of political goodwill and the resultant ranking of all organisations in the public sector has become an event that draws national attention even attended by the head of state.

According to McHugh (1996), public sector reforms have been affected by major austerity measures implemented in government and the ever-increasing demands for efficiency, effectiveness and service quality. The government of Kenya has over a period of time introduced certain strategies to improve the performance of the public service. They include; new budgeting and planning systems, contracting-out, commercialisation, privatisation and structural adjustment. These strategies however have not improved performance. Performance contracts were introduced in Kenya as part of larger public sector reforms in 2004.

1.2 Research Problem

Public organisations have continually had to encounter business-related problems like acquiring timely and highly reliable data and information, data-processing in the course of business transactions, storage of data using convenient means, and also retrieval mechanisms that enable prompt decision-making and adequate management control of the organisation (Osmonbekov et al., 2002). Traditional procurement was, or for places that use it, still is paper-based and conversation-based. In recent times however, this has been changed in many organisations to become a key strategic function. Supply chain professionals are constantly looking for suppliers that fit within an organisation's overall strategy (Bartezzaghi and Ronchi, 2003).

Some of the key indicators that signify a procurement process that has failed or one that is faulty are a lack of using standard requisition documents, inconsistent update reports to the regulatory authority, inadequate documentation, poor filing systems, low adherence to the procurement strategy guidelines, haphazard records management, poor post-award contract management, little, none or untimely procurement planning among others (Stratman, 2007). In an era of high digitalisation, public procuring entities are not contented with these old processes that were constantly flawed, nor are they content with the limited level of automation that has

been achieved thus far, and there is a general push towards exploiting further potential for optimising supply chain processes. This is the underlying key idea in the push for digitalisation. Reducing the purchase price and the overall total cost of procurement via efficiency is one of the main objectives of procurement and supply chain management.

The improvement of internal procedures has also been given a lot of significance (Caldwell, Roehrich and Davies, 2009). Organisations today are also constantly faced with ever growing procurement volumes because of organisations' shift towards concentrating on their core competencies, the internationalisation and globalisation of procurement markets, increasing market dynamics and also the constant shortening of the product lifecycle. The old or otherwise known as the traditional supply chain process involves requests for quotes, their approval, the generation of a purchase order. This entire process being manual and paper-based takes time.

However, with the advancement of information and communication technology (ICT), this process can now be made simple and is also expedited significantly because of the real-time systemised interaction between the organisation and pre-approved suppliers and trade partners, who in this day and age may be located anywhere on the globe. Nowadays, thanks to digitalization, an order may be placed, accepted, and fulfilled in a matter of minutes, and the goods will arrive in a matter of days (Lewis and Roehrich, 2009). This is a sharp contrast to the traditional process that at best would take days or weeks for simple standardised products, and months or even years for complex procurement. The above highlighted shortcomings of the traditional paper-based system necessitate and prove the need to scrutinize the effect of digitalisation on the effectiveness of procurement transactions.

Several research studies have been undertaken on digitalisation of the supply chain or procurement processes, or the use of information technology in procurement. Bauer & Gobl (2019) studied the influence of digitalisation on procurement efficiency. This study was done in

Germany and therefore did not cover the local context. Additionally, the writers focused on efficiency rather than efficacy. Bienhaus & Haddud (2018) investigated the variables that affect how supply and procurement networks are digitized. The use of e-procurement by businesses listed on the Nairobi stock market was studied by Kiburi (2008). According to a research on electronic procurement adoption by the Kenya Ports Authority conducted by Katana (2011), businesses who invest heavily in information technology are able to forge a distinctive competitive edge.

On the other side, Hamada (2012) studied how information technology affects supply chain management, using General Motors East Africa as a case study. The study revealed that information technology has a significant impact on supply chain management procedures. There hasn't been any research on the subject that has explicitly looked at how digitalizing supply chain operations affects the efficiency of procurement transactions, especially for parastatals in Kenya. The past study literature has also had difficulty demonstrating conclusively that information and communication technology and the procurement process are positively related.

The current body of knowledge shows that there is a gap in the evidence for the benefits that may be realized in the procurement process via digitization, which may have inspired or served as a background for the interest in this subject field. Results from earlier research have been contradictory. Therefore, the main goal of this research was to ascertain how supply chain digitization has affected the effectiveness of procurement transactions. Therefore, the primary research question that this study aimed to address was: What effect does the digitization of supply chain operations have on how effectively parastatals conduct procurement transactions? The researcher specifically aimed to respond to the following queries: to investigate how data consolidation impacts on the effectiveness of procurement transactions? to establish how staff digital proficiency influences the effectiveness of procurement transactions? and to find out

how Public Procurement Information Portal (PPIP) impacts on the effectiveness of procurement transactions?

1.3 Research Objectives

The main objective of this research was to find out the influence of the supply chain process digitalization on the effectiveness of procurement transactions among parastatals. A case of the Kenya Rural Roads Authority. Specific objectives include:

i. To investigate how data consolidation impacts the effectiveness of procurement transactions
ii. To establish how staff digital proficiency influences the effectiveness of procurement transactions
iii. To find out how Public Procurement Information Portal (PPIP) impacts the effectiveness of procurement transactions.

1.4 Value of the study

This research is significant because it will help parastatal management in digitizing supply chain operations to better performance. It will be helpful to other firms as they execute their digitalization initiatives to improve the efficiency of their procurement. It will also assist procurement managers in comprehending the traps that they should try to avoid in the digitalization of the procurement process. The results of this study will be helpful to academics and future researchers in the field of procurement since they will serve as a point of reference for the study's content and recommend topics for more research in the future to bring new information to the field of procurement.

Corporate enterprises working on supply chain process digitalization initiatives will benefit from this research. This research would be helpful to the Kenyan government as it implements digitalization initiatives in government facilities. This will support the creation of county and national policies for the execution of digitization initiatives. Instances of procurement

malpractice are growing quickly as a result of inefficient procedures, and this trend is continuing. This increases the importance of the study's conduct. It is very important for organisations especially in the public sector to streamline procurement processes to ensure efficient and effective service delivery. The most significant way to streamline these processes is to digitize them. This study will help professionals and consultants understand the important correlation between digitization and process effectiveness.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviewed literature which encompasses theoretical foundations, supply chain process digitization and its parameters/indicators, moreover it reviewed effectiveness of procurement transactions and its metrics. Finally, it covers the conceptual framework.

2.2 Theoretical Foundation

2.2.1 Digital Efficiency Theory

There are two terms in the English language that have many meanings. While digitalization refers to modifications and the incorporation of digital technology, digitization refers to the conversion of analog to digital (Bloomberg, 2018). This theory was proposed by Glas and Kleemann (2016), it supports running a business that embraces technology and uses it to constantly adapt and evolve with ever-changing business environment. According to a report by the European Economic and Social Committee, digitalization has improved the productivity of employees in the EU. New techniques and technologies are developed as a result of digitalization's promotion of innovation and economic development. In the end, digitalization both generates and kills employment, but it is still too early to predict how this will affect society as a whole. (2017) Groen, Lenaerts, Bosc, and Paquier

Industry 4.0 is often discussed and implemented in connection with digitalization today. At the 2011 Hannover Industrial Exhibition, the concept of Industry 4.0 was strongly promoted, resulting in a global vision of a new industrial revolution and, therefore, a buzz about the future workplace. 2017 (Pfeiffer) (Pfeiffer). The phrase was adopted by the German Federal Government when they launched a long-term strategy to ensure the sustained worldwide

competitiveness of German industry. The "Plattform Industrie 4.0," a German partnership of federal ministries, unions, scientists, and corporations, defines Industry 4.0 as follows: (Hofmann, 2017). Plattform Industrie 4.0 defines Industry 4.0 as the intelligent networking of industrial machinery and processes using information and communication technologies (Plattform Industrie 4.0, 2019). New technical features such as Big Data, Internet of Things and Services, Smart Factory, Augmented Reality (AR), or Artificial Intelligence (AI) will be created with the advent of Industry 4.0. (Bauernhansl, 2017).

When examining the different cost variables of industrial sectors or organizations, it is evident that material prices comprise a considerable share of the entire cost, but people charges often vary from 20% to 30%. In order for a corporation to realize considerable advantages, procurement must prioritize cost. (Kummer, Grün, & Jammernegg, 2013) When examining the many cost variables of industrial sectors or businesses, it is evident that the cost of materials represents a substantial percentage of the overall cost.

Modern intelligent systems will have the processing capacity, connection, and logic to assess past and future-oriented data, enabling procurement to deliver comprehensive, autonomous, and real-time job completions in the near future (Kleemann & Glas, 2018). MRP and ERP systems are no longer innovative; electronic procurement (eProcurement) and Procurement 4.0 represent the cutting edge (Glas & Kleemann, 2016).

The graphic below depicts the current phases of digitalization in procurement, along with how each level influences the tactical operations and strategic components of each stage. The degree of digitization has a higher impact on tactical operations and strategic components the more advanced it is (Kleemann & Glas, 2017).

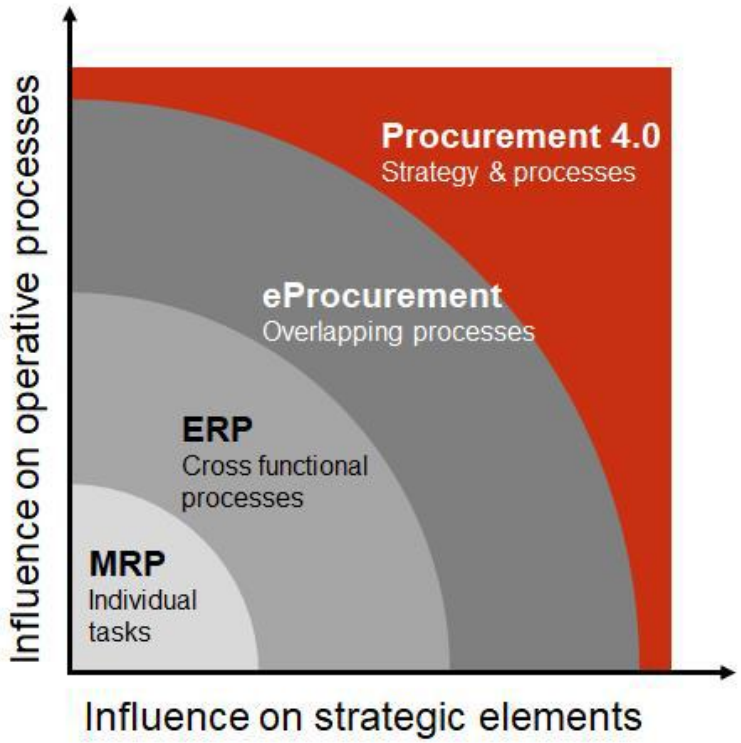


Figure 1 IT system boundaries in the procurement process. (Kleemann, 2019)

2.2.2 The Technology Acceptance Model Theory (TAM)

In an effort to understand the factors that influence the adoption and user acceptability of new technical advancements, Davis (1993) proposed and validated this hypothesis. According to Davis (1993), the design of the information system may be used to explain how perceived usability and simplicity of use affect users' willingness to adopt new technology. To achieve effective implementation and minimize resource waste, administrators of organizations must evaluate how workers feel about using e-procurement.

Companies are trying to alter their budgets as a result of the rise in procurement costs. Despite limited resources, organizations are under intense pressure to provide high-quality products and services. Many public and commercial organizations have implemented information and communication technology, which has enhanced performance via better communication, knowledge sharing, information access, and innovation (Dewett & Jones, 2001). A well thought-out strategy and procedure are necessary for the successful adoption of e-procurement.

The user's adoption of new information technology is one of the crucial factors that might thwart the effective deployment of e-procurement. Because it requires a change in how they carry out their procurement operations, the implementation of e-procurement may encounter opposition. The adjustments include switching out the old manual processes with new ones that are based on information and communication technologies. Rahim (2008) asserts that one barrier to the adoption of electronic procurement is consumers' unwillingness to change, notwithstanding their general approval.

By proposing three factors that could affect a firm's choice to adopt a new technology or innovation, Tornatzky and Fleischer (1990) expound on its adoption. Coercive pressures from other similar organizations always tend to vary, so this is a force that arises from the environment in which a firm operates. Normative pressures are as a result of the sharing information which to some large extent influence the decisions taken by organizations. These are organizational context, technological context, and environmental context (Cox, 2010).

2.3 Digitalization in the Procurement Process

Immense business advantages and benefits have been realised because of successful e-procurement initiatives. Among these benefits include cost savings, enhanced knowledge, improved connections, greater efficiency, and the smart use of buying employees. E-procurement may result in cost savings in two different ways: by lowering the actual cost of the things purchased or by lowering the cost of executing a purchase order. The organization may aggregate the total purchases for various products utilizing digital procurement systems, and contract pricing can then be based on volume criteria. Owing to larger purchase volumes, the organisation will be able to negotiate the pricing downwards driving the cost of individual items lower.

In support of this argument, the National Association of Purchasing Management (NAPM) estimated that on average an organisation pays 15-25% more for goods, services and works

when purchases that have not leveraged an existing contract are made (Lui, 2008). When a firm fosters close relationships with a leaner number of suppliers, it is able to negotiate better terms of delivery across multiple deliveries which are consolidated into single orders. The organisation can realise cost benefits by controlling from whom employees can purchase from.

The procurement function should provide a range of approved vendors only from whom employees are allowed to buy from. This will generally reduce the overall purchasing spend of the organisation. One of the ways in which this can easily be achieved is through centralising data or what is otherwise known as data consolidation. When the organisation makes use of central databases that provide procurement information - such as whom to buy from – to employees, then it begins to make strides towards leveraging digitalisation to improve procurement processes.

According to a study by The Aberdeen Group, leakage or buying off contracts alone contribute for between 30 and 40% of an organization's OR expenditures (Robert, 2003). Because end users may directly make their orders to authorized suppliers at pre-approved price levels without ever interfacing with the procurement department, the firm's expenses are often decreased. This feat is only achievable if all the staff with responsibilities that fall within the buying (procurement) process are well trained and have honed the requisite digital proficiency that enables them to optimise the digital infrastructure the organisation is investing in. Whenever required, approvals can be requested electronically and this will eventually reduce the lead times within the organisation. By transmitting the data electronically, by effect employees are also able to reduce errors substantially. Through the procurement electronic infrastructure, the organisation is able to have overall visibility of all the purchasing data and this provides the opportunity for managers to negotiate increasingly better terms with external suppliers based on volumes which create economies of scale, but also based on pricing and of course product quality.

In a similar manner, due to the improved data visibility, the organisation is able to put into account supplier performance metrics when negotiating supply terms with them and when deciding on sourcing strategies for various goods and services (Rai, Patnayakuni and Seth, 2006). Through the procurement IT systems, an organisation can also be able to analyse purchasing history and be able to compute the total ownership cost instead of just the buying price of a given good. The information system can also be leveraged by the ultimate users so that they can track the status, delivery and payment terms of their orders. This will give the end users an opportunity to plan well and manager the requirements of their orders. Through internal organisational databases, the firm is able to store and keep information regarding supplier catalogues, pricing and this allows the end users to order based on current prices and the pre-approved suppliers. Basically, the use of ICT systems will increase procurement efficiencies which includes the workflow process from producing a request for purchase to payment as the process is managed electronically thereby reducing human error and drastically cutting down the processing duration.

Overall, these gained efficacies facilitate a condensed procurement cycle duration which the Aberdeen Group has estimated is reduced by up to 70%. The time saved thereof enables the organisation to have reduced inventory levels and this adds up to cost savings because of better cash flow and the reduced costs of carrying inventory (Rai, Patnayakuni and Seth, 2006). The procurement department should set minimum order quantities and overall spend for different users, sections and departments to enable multiple purchase requests to be consolidated. The advantage of this is that the total quantity of purchase orders will be decreased, which will lower the processing expenses (Lui, 2008).

When an organisation makes the decision to digitize its procurement processes, it has to undertake a dedicated analysis and planning effort in order to minimize risks likely to occur during this process. The effects on individuals within and outside the organization are one of

the main concerns connected with this (Lewis and Roehrich, 2009). Organizational transformation will occur when the procurement operations take on a strategic function rather than a strictly tactical one. Procurement traditionally has been a much clouted as well as lengthy and centralised function in the organisation. It has to be properly controlled since turning it around to even enable individuals to place orders from their PCs would be seen as a significant shift (Telgen, Zomer, & de Boer, 1997). To manage this change effectively, the organisation should plan for training and support for the procurement staff as well as the end users (Ray, Muhanna, & Barney, 2005). In order to give the change process a boost, the senior management of the organisation must lead by example to show leadership and prop the change process to ensure success and compliance.

Trust plays a very big role in maintaining quality supplier relationships. Thus, the organisation at this time must manage supplier perceptions in order to promote a common understanding thereby fostering fruitful relationships. When communicating with suppliers, the organisation must be very clear in stating its objectives so that the suppliers understand the digitalisation initiatives are aimed at strengthening the supplier relationships, otherwise some suppliers might view change as a threat to their operations and status quo. This kind of an approach will increase the chances of success of the digitalisation projects since the organisation will have obtained the buy-in of this critical group of stakeholders (Lewis and Roehrich, 2009). Interactions with customers and suppliers will often be impacted by changes made to internal procedures that have an influence outside of the organization's borders (Wenyang, 2005). This presents a chance to strengthen supplier ties even further in order to improve productivity and effectiveness and raise the company's bottom line (Kohli and Grover, 2008).

This project should be carried out as part of the execution of a procurement management strategy in order to guarantee the success of digitalization initiatives. This should start with an examination of the existing number of suppliers and how much the organisation spent on them in a given period of time. Given the previous lack of a procurement information system, this

data may be hard to obtain because it will not be available in a format that is suitable for comparison. However, once this information has been gathered, it serves as the foundation for maximizing the number of suppliers, choosing which ones to bargain with over price and supply conditions, as well as choosing which ones to quit doing business with (Robert, 2003). A great effort towards this realisation has been seen in the Government of Kenya's initiative of building a Public Procurement Information Portal (PPIP) which has been providing this supplier information for government ministries and parastatals. It optimises the number of suppliers, their pricing structures and even the conditions for supply and how frequently they are used.

Determining and stating with confidence what the organization is attempting to accomplish as well as how success will be evaluated or defined will be of the highest significance (Wenyang, 2005). Before a firm purchases a software system to digitize its procurement process, it must evaluate the user functionalities it requires; this forms the basis of its interrogation of potential system vendors. The firm must also first audit its current procurement processes to determine their suitability and efficiency. If they are not optimised, this would be a good opportunity to change and improve the processes instead of simply automating old inefficient processes.

A detailed and thorough audit will provide the background for re-engineering processes in a bid to improve them. Making sure that appropriate controls are put in place to reduce risk and make sure that the organization can assess and monitor compliance is the last stage in enhancing procurement procedures (Deming, 1986). Once the organisation has procured the new software system, it will then go through what is referred to as deployment processes where these are the activities performed to ensure the new system is fully implemented and is up and running (Robert, 2003). A system life cycle that starts with identifying user needs and continues through real system acquisition, installation, and on through until all contract terms and conditions have been met may be used to conceptualize the full process of establishing a new

system. Each software service or good that the company purchases will have a unique product life cycle (Carlsson, 2003).

In order to move forward with the procurement process for the new system, the organization must first determine the user requirements, which is a crucial step in developing a business case or justification for the project, identifying requirements and specifications, and obtaining the necessary approvals (Deming, 1986). This process will include other sub-activities like putting together project teams, using business analysis techniques like cost-benefit analysis in order to justify certain requirements, identify plausible alternatives, determine and assess certain risks and corresponding benefits, lobbying for project goodwill among employees and of course obtaining the relevant top management approvals for the system procurement.

2.4 Effectiveness of Procurement Transactions

Despite the extensive efforts of international organizations toward this objective, the procurement function has not received the prominence that is due to it as a crucial role inside organizations, particularly in the developing world and the public sector. In particular, inside government and public sector organizations, the World Bank, the International Trade Organization, the United Nations Conference on Trade and Development, and other institutions have been trying to ingrain a culture of building reliable procurement procedures. In many cases, this lack of interest in enhancing the role of procurement may be purposeful, but in other cases, it may just be a lack of understanding of the benefits that the procurement function can bring to any organization (Telgen et. 1997).

Amaratunga & Baldry (2002) suggest performance as a key driver towards the improvement of the quality of goods and services, while its absence or the use of inappropriate methods will act as an impediment to change and will probably result in the procurement function being undermined. This is in order for organizations to change their focus and increase their

competitiveness. Businesses and organizations without performance-based internal processes, procedures, and strategies are likely to perform less successfully, have greater customer discontent, and have more staff turnover (Artley & Stroh, 2001, Amaratunga & Baldry, 2002 and CIPS Australia, 2005).

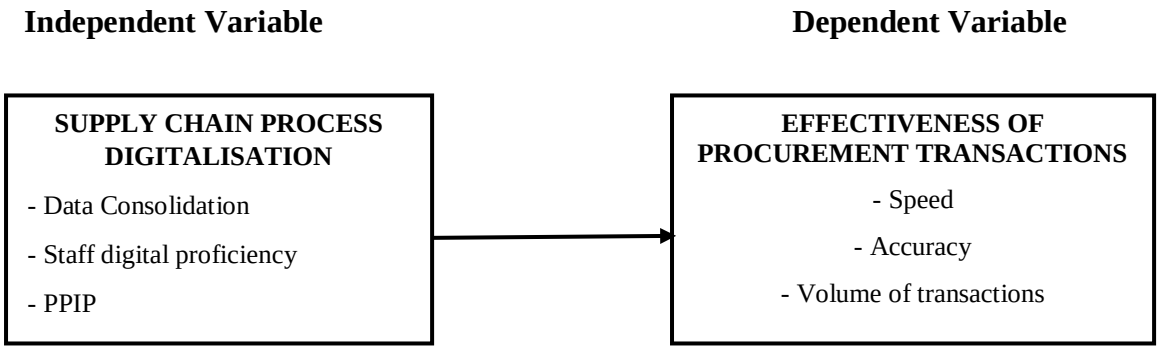
According to Batenburg & Versendaal, measuring the efficiency and performance of the procurement function will benefit the buying organizations by resulting in cost savings, increased profitability, a steady supply of supplies, improved product and process quality, and a stronger competitive advantage (2006). Making a detailed and fact-based review of the risks that are most likely to occur in any procurement process is a crucial first step in reducing procurement risk. Through careful planning and access to high-quality information, some of the procurement risks that are most likely to occur may be avoided or controlled (Artley & Stroh, 2001).

The effectiveness of procurement transactions can be measured in any of the following ways: under data consolidation, we can measure effectiveness based on how easily information can accessed through the central storage where it is stored and also through how easily staff can retrieve historical documents that would make current work easier. Under how proficient staff actually are with the digital infrastructure, the effectiveness of procurement transactions will be measured based on whether the turnaround time for completion of tasks does reduce; and also based on how much staff feel they are efficient in their work. In the use of the Public Procurement Information Portal (PPIP), effectiveness of procurement transactions can be measured by looking at the actual availability of the required information from the portal and also the ease of document retrieval from the portal.

2.5 Conceptual Framework

The conceptual framework provides a summary of the relationships between the independent and the dependent variables. In particular, the independent variable was supply chain process

digitalization as highlighted by three key factors namely; data consolidation, staff digital proficiency and the public procurement information portal (PPIP). The dependent variable was measured through three key metrics which are speed, accuracy and the volume of transactions.



CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

This chapter describes the study approach that was used to gather data on supply chain digitization and the efficiency of procurement transactions. Primary data was collected to gather qualitative information for this research's goal, which was then appropriately analyzed. This chapter focused on the study design, selection of the company, methods for gathering data, and data analysis.

3.1 Research Design

A research design is the end result of an examination of the circumstances that often surround the phenomena being studied. It helps the researcher to gather and analyse data in a way that aims to connect the research's importance to actual economic activity (Kothari, 2004). A case study approach was used in this investigation. With the case study approach, a social entity—such as a person, a home, an organization, a traditional group, or a whole community—is examined in-depth and thoroughly (Kothari, 2004).

A case study is an empirical investigation that explores an existing notion or phenomena in its actual setting, according to Yin (1994). It enables the researcher to thoroughly investigate people or organizations. The results or findings from case studies many times suffer from selection and observation biases. This would a lot of time be the case if the researcher is associated with the study target. Due to the fact that the researcher is not a member of the organization being studied, these flaws in the case study technique have already been addressed.

3.2 Choice of the Firm

The Kenya Rural Roads Authority (KeRRA) is a parastatal under the Kenya Roads Board. With a network of about ten regional offices with decentralised procurement, it is a perfect

choice for the researcher to examine how the regional procurement personnel integrate to centrally access information and monitor resources under the key objectives of this study – data consolidation, staff digital proficiency and the use of the PPIP. The size of the organisation matters for a case study because of the ability to access the information through a fair number of sources. The parastatals and other public offices in Kenya are currently undergoing a digitalisation renaissance, and therefore for such a study topic, KeRRA is ideal. The firm concentrates on the development of rural roads away from the urban and peri-urban centres which are more digitalised; the researcher therefore was likely to unearth a unique set of data that shaded more light on this research problem.

There are various reasons for choosing KeRRA as a firm for supply chain research in Kenya. Firstly, the company has a strong presence in Kenya, with a large network of suppliers and customers. Secondly, KeRRA had a good reputation for quality and service. Finally, the company has a lot of experience in supply chain management, and is able to offer research and consulting services in this area. In addition, KeRRA is a member of the Kenya Private Sector Alliance (KEPSA), which is a key stakeholder in the development of the country's supply chain industry. KEPSA is working closely with the government to improve the efficiency of supply chain operations in Kenya. As a result, KeRRA is well positioned to give valuable perceptions into the development of the supply chain industry in Kenya.

The case study method proposed by Yin was used to answer the research questions for this study (1994). Only data related to supply chain management of KeRRA was gathered for this project. Individual or company-wide information on the buying and supply chain staff's supply chain management, including their interactions with suppliers and internal customers, were requested. The researcher asked clients on questions on how they communicate digitally with the procurement or supply chain departments. Second, a single business was chosen as the analysis's unit in order to precisely define the study's goals. This single case design technique

will be utilized to assess the current digitalization trends critically and provide beneficial prospects for in-depth research inside the single case study (Yin, 1994).

3.3 Data Collection

Data collection is the process of corresponding with respondents within the target demographic (Cooper & Schindler, 2006). Primary data was used in this investigation. An interview guide was used to collect primary data. The interview guide was unstructured questions which enabled the researcher to collect varied information from the respondents. The guide was divided into three sections. The first section sought data on general topic such as demographic characteristics of the respondents. The second part focused on the information whether the respondents clearly understand the research topic. Lastly, the third section focused on the three research objectives in this research. The researcher interviewed employees from the Kenya Rural Roads Authority, specifically from the procurement department, technical department, finance and ICT department.

The researcher interviewed 20 senior employees, in order to get a representative sample. The rationale for this is to understand how digitalization of the supply chain process has affected procurement transactions within the organization and also to obtain first-hand information about the digitalization of the supply chain process and the effectiveness of procurement transactions among parastatals. Each interview was preceded by a letter of transmittal to the respondents which was provided with a brief explanation of the purpose of the research. The researcher then on the date agreed executed the interview with the respondents and recorded the data through note-taking. The study only focused on data mainly from staff that have attained supervisory level of work.

3.4 Data Analysis

Analyzing qualitative data from the interview guide, we could draw judgments on how different kinds of data were linked together. In order to assess the answer, make conclusions and draw suggestions, content analysis was utilized. The content analysis approach began with familiarizing the data, assigning preliminary data codes to define the content, looking for patterns or themes in the codes through several interviews, examining themes, defining and identifying themes, and lastly drawing conclusions from the findings. On the basis of these findings, the researcher analyzed the supply chain process digitalization and the effectiveness of procurement transactions at KeRRA. A similar approach was also used by other researchers like Mogeni (2008), Evans (2010) and Ateng (2007).

CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the findings of the analysis from the primary data that was gathered from the field. The research study objectives were to investigate how data consolidation impacts the effectiveness of procurement transactions, to establish how staff digital proficiency influences the effectiveness of procurement transaction and to find out how Public Procurement Information Portal (PPIP) impacts the effectiveness of procurement transactions. The findings are presented thematically in subsequent sections.

4.2 Response Rate

The researcher sought to interview 20 senior managers from Kenya Rural Roads Authority, specifically from the procurement department, technical department, finance and ICT department. Out of the 20 respondents, 18 senior managers were available and willing to participate in the study. These represented a 90% response rate. The response rate was adequate and in accordance with Mugenda and Mugenda (2003) who stated that response rate of more than 70 % ought to be satisfactory.

Table 4.1: Response Rate

	Frequency	**Percentage**
Response	18	90
Non-Response	2	10
Total	**20**	**100**

Source; Research Data (2022)

4.3 General Information

In order to appreciate and understand the respondents who took part in the study, the researcher sought to collect their general information.

4.2.1 Work Experience

The researcher sought to determine the number of years the respondents had worked in the organization.

Table 4.2: Work Experience

Work Experience	Frequency	Percent	Valid Percent
1-5 Years	2	11.1	11.0
6-10 Years	3	16.7	17.0
11-15 Years	3	16.7	17.0
Over 15 Years	10	55.5	55.0
Total	**18**	**100.0**	**100.0**

Research Data (2022)

From the findings, most of the respondents 55% had worked more than 15 years, 17% have worked between 6-10 years and 11-15 years respectively and 11% between 1-5 years. This can be interpreted to mean that respondents of the study had worked in their organizations for a longer period of time and thus they were able to understand the supply chain digitalization and effectiveness of procurement transactions as sought by the study.

4.2.2 Level of Education

The researcher study sought to determine the level of education of the respondents.

Table 4.3: Level of Education

Level Of Education	Frequency	Percent	Valid Percent
Tertiary College	0	0.0	0.0
Bachelor's Degree	7	38.9	39.0
Master's Degree	10	55.5	56.0
Doctorate Degree	1	5.5	5.0
Total	**18**	**100.0**	**100.0**

Source; Research Data (2022)

From the findings, most of the respondents 56% had Master's degree, 39% have bachelor's degree and 5% had doctorate degree. This can be interpreted to mean that most respondents of the study had knowledge and skills to understand and interpret the posed questions on supply chain digitalization and efficiency of procurement transactions as sought by the study.

4.4 Supply Chain Digitization

Respondents were asked to indicate how their organisation practice data consolidation using central database management systems and to what extent. The findings indicated that all respondents agreed they practise data consolidation using data central database management systems at a very large extent, which has helped the organization in the execution of procurement transactions. One respondent agreed to this fact by identifying a central database management system that outlines how the organization has been able to attain the broad goals and objectives in the procurement functions. This definition is in line with Podlogar (2006), who established that digitization by use of internet and communication technologies has enabled simplification of procedures ,faster processing of task and enhance the overall effectiveness in the organization.

Respondents of the study were asked to indicate how versed they are with the use of ICT especially those that interact with procurement and at what extent is their training in ICT. From the findings, most of the respondents in the procurement department indicated that there are well versed with the use of the information communication technology platform in the organization. Although a few respondents established a few challenging experiences with the use of the procurement government portal, but with training and interactions with other colleagues, they have mastered the use of the portal disposed on them. The study revealed that they have a few training in regards to the use of ICT platform although the few they had has been helpful to execute their mandate in the organization. The finding was in line with Ray, Muhanna & Barney, 2005 who indicated for effectively use of the ICT system in the

organization, there is need to plan for training and support the procurement staff as well as the end-users.

The study sought to understand whether the organization is making use of the Public Procurement Information Portal (PPIP) and how much use or benefit is it to the organisation. From the findings, most of the respondents said that the organization is fully using the public procurement information portal and they tend to use it mostly with the interaction with suppliers of various goods and services and ensure compliance with the regulatory authority. It was also established that there has been positive and significant benefits accrued from the use of the public procurement information portal especially to access seamless information, co-ordination with the various department in the organization and supporting the operations of the firm. The study findings were in line with Rai, Patnayakuni and Seth, 2006, stated the use of ICT systems will increase procurement effectiveness which includes the workflow process from producing a request for purchase to payment as the process is managed electronically thereby reducing human error and drastically cutting down the processing duration.

4.5 Effectiveness of Procurement Transactions

Respondents were asked to indicate how data consolidation has improved the ease of information access. The study established that data consolidation has greatly improved the accessibility of the information. The respondents agreed that indeed data consolidation has greatly helped since the organization tends to have multiple offices countrywide, making it difficult to access timely information from different regions but with data consolidation it has helped to have one point of access and enhance the data into insightful information that help decision-makers to make prompt and effective decisions. It was also established that data consolidation also helps in the flow, control and visibility of the information which has helped the organization to have a holistic view of the departments, customers and suppliers and how these different areas interact with each other for better decision-making. The study findings

were in line with Artley & Stroh, 2001 that indicated with careful planning and access to high-quality information, some of the procurement risks that are most likely to occur may be avoided or controlled hence greater efficiency in the procurement function.

Respondents were asked to indicate if data consolidation has helped with the ease of document retrieval and to what extent. From the findings, majority of the respondents indicated that data consolidation has helped with the ease of document retrieval at a very large extent. It was indicated that it has helped in the retrieval of the document through streamlining their data resources from multiple types of data. It was also established that through data consolidation the organization has gained a 360-degree view of the documents in one place which has streamlined the execution of the procurement functions and simplified the access of the information. One respondent also discovered the benefits of the data consolidation to retrieve the documents but at one point it leads to the loss of data and information that were critical in the organization, so proper consolidation can also be done with a back-up in order to make retrieval better in case of loss of document through data consolidation. The findings are in line with Bauer and Gobl, 2019 who established that data consolidation can make documents more accessible and improves the turnaround time for analysis and report generation for decision making purpose.

Respondents were asked to indicate how ICT staff training has reduced the turnaround time of tasks in their functions. Most of the respondents indicated that ICT training has really helped in the reduction of time to perform tasks in the organization. The study established that ICT training has helped employees build new job skills which they have used to communicate with other employees, respond to queries and complaints, reduce the cost of operations in the organization. It was also noted that through ICT training employees have been able to reduce the errors, reduce the time taken to complete certain tasks in the organization hence making the procurement function effective and efficient in the organization. The findings were in line with

Ray, Muhanna and Barney, 2005, who established to effectively manage and realize the benefit of ICT processes and functions, training and support of the staff is essential.

Respondents were asked to indicate whether they believe that staff ICT training has improved their effectiveness. The study established that ICT training has improved on the effectiveness of the operation through reduction of time spent to perform tasks, reduction of errors during the executions of tasks, prior communications to relevant teams in the organizations, real time monitoring, instant customer/supplier support, systematic management and accurate planning. Respondents indicated that day-to-day activities of the employees in various sections and departments have greatly improved because of the ICT training. Although, most respondents also indicated that there is need for more training in order to be updated with the knowledge technologies available in the organization especially those implemented by the national government. The study finding is in line with Batenburg and Versendaal, 2006, stated that training helps the organization in cost-saving and reduction of time in performing organization activities hence improving the efficiency and effectiveness of the firm.

Respondents were asked to indicate if PPIP provides the data or information that they were seeking at any given point in time. The findings indicated that PPIP provides the timely information in the organization. It was established that PPIP has really played a huge task in convening relevant and timely data in the organization. It was noted that PPIP is a communication platform with suppliers in regards to publication of contracts awards and tender notices. The respondents were also asked how easy is it to retrieve information needed from the PPIP. Most of the respondents indicated that PPIP is a user friendly platform, hence it is very easy to access the data and information published on the PPIP.

It was also established that being an internet-based platform, it can be accessed in a timely manner on an internet connectivity area. Thus, the information on the PPIP can be retrieved easily, timely and well understood since it has been summarized to ease decision-making in the organization. The study findings is in line with Robert, 2003 who stated that public

procurement information portal provides timely and readily available data and information of government ministries and parastatals to suppliers in order to optimize their working relationship in regards to contracts, supplies, pricing structures and terms and conditions of supplies.

4.6 Discussion of the Findings

It was established that the organization has data consolidation by the use of data central database management systems, which has helped the organization in the execution of procurement transactions. But it was also established that by identifying a central database management system that outlines how the organization has been able to attain the broad goals and objectives in the procurement functions. The findings were in line with Podlogar (2006), who established that digitization by use of internet and communication technologies has enabled procedures simpler, boost production, and enhance the overall efficiency in the organization.

It was also established that the procurement staff were well versed with the use of the information communication technology platform in the organization. Although it was also established that some staff had challenges in the use of the procurement governmental portals, but emphasizes on training on the use of the ICT platform it will be helpful in executing their procurement mandate. The finding was in line with Ray, Muhanna, & Barney, 2005 who indicated for effectively use of the ICT system in the organization, there is need to plan for training and support to the procurement staff as well as the end-users.

It was also established that the organization has fully implemented the public procurement information portal as a platform to associate with suppliers and various departments. It was also established the use of the public procurement information portal has enabled the accessibility of seamless information, co-ordination and execution of the procurement functions. The study findings were in line with Rai, Patnayakuni and Seth, 2006, that stated the use of ICT systems

will increase the effectiveness of procurement which includes the workflow process from producing a request for purchase to payment as the process is managed electronically thereby reducing human error and drastically cutting down the processing duration.

It was established that data consolidation has greatly improved the accessibility of the information in the organization hence created a holistic view of the departments, customers and suppliers and how these different areas interact with each other for better decision-making hence efficiency in the organization. It was also established that through data consolidation the organization has gained a 360-degree view of the documents in one place which has streamlined the execution of the procurement functions and simplifies the access of the information. The study findings were in line Artley & Stroh, 2001 that indicated that with careful planning and access to high-quality information, some of the procurement risks that are most likely to occur may be avoided or controlled hence greater efficiency in the procurement function.

It was also established that ICT training has really helped in the reduction of time to perform tasks in the organization. The staff have been able to build new job skills, reduce the cost of operations in the organization. The training has also enable the staff to reduce the errors, reduce the time taken to complete certain tasks in the organization hence making the procurement function effective and efficient in the organization. The findings were in line with Ray, Muhanna and Barney, 2005, who established to effectively manage and realize the benefit of ICT processes and functions, training and support of the staff is essential.

It was established that PPIP provides relevant and timely data and information in the organization. PPIP being a communication platform with suppliers has enhanced retrieval of information needed by suppliers, customers, government and even the public. It was also established that being an internet-based platform it can be easily accessed in a timely manner hence prompt decision making. The study findings is in line with Robert, 2003 who stated that

public procurement information portal provides timely and readily available data and information of government ministries and parastatals to suppliers in order to optimize their working relationship in regards to contracts, supplies, pricing structures and terms and conditions of supplies.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the findings of the study based on the objective. The summarized findings are used to make conclusions. The recommendations are provided based on the findings of the study. The limitations of the study are also well stated. The areas for further studies are discussed in detail.

5.2 Summary of the Findings

The study was set out to investigate the impact of data consolidation on the effectiveness of procurement transactions. The findings indicated that data consolidation uses the data central database management systems, which has helped the organization in the execution of procurement transactions. The use of the data consolidation had greatly affected the effectiveness of the procurement transactions by making information available, timely and easily accessible and having data in one place which has increased productivity.

The study was set out to investigate the impact of staff digital proficiency on the effectiveness of procurement transactions. The findings indicated that staff digital proficiency has greatly influenced the procurement transactions. It was established that procurement staff were well versed with the use of the information communication technology platform in the organization. Although the finding indicated there was need for training in order to be familiar with the most current technologies. Through the staff proficiency, the organization has been able to reduce the time spent to execute the task, reduction of the errors and at the same time it has increased the effectiveness of their procurement transactions.

The study was set out to find out the impact of the Public Procurement Information Portal (PPIP) on the effectiveness of procurement transactions. It was established that PPIP provides

the timely information in regards to publication of tender notices, evaluation reports, awards and contracts. It was also established that being an internet based platform, it is very easy to access the data and information published on the PPIP. Thus the information on the PPIP can be retrieved easily, timely and enable interaction with other stakeholders such as the suppliers, contractors and the regulatory authority hence creating efficiency of the procurement transactions.

5.3 Conclusion

The study concludes that data consolidation, staff digital proficiency and public procurement information portal has a positive and significant effect on the effectiveness of the procurement transactions. It was established that data consolidation through the use of the data central database management systems has made the data and information available, timely and easily accessible. It was also established that staff were well versed with the use of the information communication technology platform in the organization which has made the firm to reduce the time spent to perform tasks, reduce errors and increase the productivity. The study also concluded that Public Procurement Information Portal has provided timely information in regards to publication of tender notices, evaluation reports, awards and contracts. It was also established that being an internet based platform, it is very easy to access the data and information hence faster and better decision-making by the management of the organization. It was concluded that there was need for training in order to increase staff proficiency and familiarity with the current technologies in the procurement functions in order to increase efficiency in the procurement transactions in the organization. The study also concluded there is also need to install and commission the most current technologies such as cloud computing technologies in storage of the data and also to secure the data through data centres, these technologies will ensure the procurement function is efficient and effective.

5.4 Recommendations of the Study

The study recommends to the management to invest more on data consolidation which has greatly improved the accessibility of the information in the organization hence created a holistic view of the departments, customers and suppliers and how these different areas interact with each other for better decision-making hence efficiency in the organization.

The research also recommends that organizations full implementation of the PPIP which provides relevant and timely data and information in the organization. PPIP being a communication platform with suppliers it will be important for the organization to make the information with suppliers to be seamless and easy for retrieval of information hence a faster and authentic data for decision making.

The research also recommends to the management of the Kenya Rural Roads Authority (KeRRA) to effectively prepare and empower employees through training before implementation of technologies in the organization. This will go a long way to reduction of resistance to change and thus effective use of ICT technologies being implemented in the organization. The management of KeRRA should also employ most current technologies in order to make procurement transactions more effective and efficient.

The study recommends that policy makers in the National Treasury and Public Procurement Regulatory Authority should increase the amount of budgetary allocation at KeRRA. This will go a long way in implementation of the current technologies and training of staff in order to increase the effectiveness of the procurement transactions.

5.5 Limitations of the Study

The current study was limited to case study design, where the study specifically used a case of Kenya Rural Roads Authority. The use of case study design was supported by interviews and the qualitative data was collected. A total of 20 interviewees comprising of top management

and middle level management of KeRRA were interviewed in the study. To analyse the data, only content analysis was used and thus no descriptive or inferential statistics were used in analysis of the findings.

5.6 Suggestions for Further Studies

Since the current study used a case study design, future studies should consider the use of descriptive, exploratory or causal design. This will allow the use of inferential statistics including regression and correlation analysis. These are important statistical methods because they allow drawing of inferences and deductions as opposed to the use of qualitative methods which can be subjective. The use of these techniques will mean that future studies should choose a large sample proportion of firms as opposed to a single firm.

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APPENDICES

APPENDIX I: INTERVIEW GUIDE

SECTION A: GENERAL INFORMATION

1. Name of respondent's department at KeRRA (optional):

   ……

2. Position: …….....

3. Number of years respondent has worked at KeRRA. (Tick whichever is appropriate)

   1 - 5 Years ……..

   6 - 10 Years ……

   11 – 15 Years …….

   15 years and above…….

4. Respondent's level of education? (Tick whichever is appropriate)

   Secondary School (……..)

   Tertiary College (……..)

   Bachelor's Degree (……..)

   Masters Degree (……..)

   Doctorate Degree (……..)

SECTION B: - SUPPLY CHAIN DIGITALIZATION

Question	**Explanation**
Does your organisation practice data consolidation using central	

database management systems? To what extent?	
How well versed with the use of ICT are staff in your organisation – especially those that interact with procurement? What is the extent of their training in ICT?	
Is the organisation making use of the Public Procurement Information Portal (PPIP). Of how much use or benefit is it to the organisation?	

SECTION C: EFFECTIVENESS OF PROCUREMENT TRANSACTIONS

Data Consolidation	
Please explain whether data consolidation has improved the ease of information access.	
Has data consolidation helped with the ease of document retrieval and to what extent?	
Staff Digital Proficiency	

Has staff ICT training reduced the turnaround time of tasks? Please explain.	
Explain whether you believe that staff ICT training has improved their efficiency.	
Public Procurement Information Portal (PPIP)	
Does the PPIP provide the data or information that you are seeking at any given point in time?	
How easy is it to retrieve information needed from the PPIP?	

Please offer any other comments on how certain aspects of digitalisation have affected the effectiveness of procurement transactions in your organisation.

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