EFFECT OF INFORMATION TECHNOLOGY ON TAX COMPLIANCE BY KENYA REVENUE AUTHORITY IN NAIROBI, KENYA

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A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF ECONOMICS, ACCOUNTING AND FINANCE IN THE SCHOOL FOR BUSINESS IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE POSTGRADUATE DIPLOMA OF INCOME TAX, JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY.

2019

DECLARATION

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

……. ……

Signature Date

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

……. ……

Prof. Muturi

Signature Date

DEDICATION

This research project is dedicated to my family for their support and encouragement throughout my entire academic journey.

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ACRONYMS AND ABBREVIATIONS

DICE	-	Digital Invoice Customs Exchange
DIT	-	Diffusion of innovations theory
ICMS	-	Integrated Customs Management System
ITMS	-	Integrated Tax Management System
KRA	-	Kenya Revenue Authority
MTIC	-	Missing Trader Intra Community
PAYE	-	Pay As You Earn
SME	-	Small and Medium Enterprise
UTAUT	-	Unified Theory of Acceptance and Use of Technology
TAM	-	Technology Acceptance Model
TIMS	-	Tax Invoice Management System
VAA	-	VAT Auto Assessment
VAT	-	Value Added Tax

DEFINITION OF TERMS

Big data - large data sets that may be analysed computationally to reveal patterns, trends, and associations.

Big data analytics - process of examining large and varied data sets to uncover hidden patterns, correlations, and other insights that make an organization make informed business decisions.

Blockchain - a decentralized, distributed database that is used to maintain a continuously growing list of records, called blocks.

Itax - a web-enabled and secure application system that provides the taxpayer a linkage for registration, filing, payment, and status inquiries with real-time monitoring of accounts.

Tax base - all items or activities subject to a tax.

Tax compliance - degree to which a taxpayer complies (or fails to comply) with the tax rules of his country such as declaring income, filing a return, and paying the tax due in a timely manner.

ABSTRACT

The Kenyan government has had budgetary shortfall to finance both its capital and recurrent expenditure. With the big projects initiated by the government, it has forced the government to borrow externally. Since tax is the largest source of revenue for the government, the Kenya Revenue Authority has a huge challenge to increase its revenue collection. One of the reason for revenue collection shortfall by Kenya Revenue Authority can be attributed to low tax compliance and therefore the tax collector has been looking at ways to increase tax compliance of taxpayers. This has led to KRA to implement information technology so as to improve tax compliance. One of the information technology implemented is iTax, and others that KRA plans to implement is big data analytics and blockchain technology. With the technology aspects being implemented or being in plan of implementation, the study sought to determine the effect of information technology by Kenya Revenue Authority on tax compliance in Nairobi, Kenya, and more so, the effect of iTax on tax compliance; the effect of big data analytics on tax compliance; and the effect of blockchain technology on tax compliance. With the research objectives, the study analysed the theoretical and empirical literature, with the theories used being diffusion of innovations theory, technology acceptance model, and united theory of acceptance and use of technology. The concepts around the information technology were analysed and empirical research done to analyse the outcome and was used to compare with the findings. The study formulated a conceptual framework which operationalized the variables based on the technology acceptance model. The study also identified the gaps in the empirical research and how it will fill the gaps. The study employed a descriptive survey research design to get the good description of the phenomenon under study. The target population was all the I.T staff at the Kenya Revenue Authority who are based at The Times Towers who were 65 in number. Purposive sampling technique was used to identify respondents and they were 46 so as to be adequately representative. A questionnaire was the tool for data collection and was sent to the respondents through email. The data was thereafter analysed using descriptive statistics which include means and standard deviation, and inferential statistics which was regression analysis. The study findings indicated that in general, information technology has an effect on tax compliance i.e taxpayers' registration, filing of returns, and income declaration. The study also found that iTax system has an effect on tax compliance to a very great extent and also well accepted by users, while data analytics and blockchain technology have an effect on tax compliance to a great extent and also the acceptance of the technologies are well accepted. Regression analysis indicated that iTax system and big data analytics had significant effect on tax compliance while blockchain technology had no significant effect on tax compliance. The study recommended that proper training needs to be done on new information technologies and also implement change management so as they can be effective. It also recommended that the government needs to create favourable policies to enable data privacy for users.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Tax is the main source of revenue for most governments which enables them to provide public goods and services. However, billions of money are lost around the world every year by tax administrations due to non-compliance, evasions, frauds or non-collection (Avisek and Seeboli, 2014). This has made various countries to come up with ways to increase tax compliance and reduce evasions and fraud. As the need for revenue mobilization has grown in importance, facilitating tax compliance and reducing the gaps in the oversight system have become major concerns for tax administrations worldwide (Evans, Lang, Pistone, Rust and Schuh, 2018). Tax administrations can therefore adopt one of the following two options: to improve tax enforcement, or adjust their operations in accordance with the so-called “motivational postures” of taxpayers. Importantly, however, both approaches greatly rely on the developments realized with regard to tax transparency.

In Africa, tax compliance and evasion is experienced greatly as compared to developed countries (Kim, 2008). There are no tangible statistics on tax evasion scores in most the African countries. Statistics such as collected tax as a percentage of GDP can however be used. Comparison done for tax evasion scores of developing African countries compared with that of developed and transition countries shows that African developing countries experience the worst in tax evasion (Kim, 2008). This is because significant numbers of African countries have scores of 1 compared to a few transitioning economies, whereas developed countries had none with a tax evasion score of 1. As at 2002, developing

countries had their average tax evasion statistic ranging between 35% and 55% of the Gross Domestic Product (GDP), which indicated worse performance compared to developed nations such as the US (Terkper, 2003).

Tax compliance is affected by both economic and non-economic factors. Economic factors include the actual income level, tax rates, tax benefits, tax audit, fines, penalties, and the probability of an audit. Non-economic factors that affect tax compliance include personal attitude towards taxes, perceived equity of tax system, and personal, social and national norms (Mişu, 2011). Tax administrations are increasingly concerned with distortions produced by a lack of connection between tax and value-generating activity worsened by the compound effect of globalisation and digitalisation. Most large companies today not only operate cross-border, but also are increasingly moving onto online platforms. At the same time SMEs are becoming more sophisticated and are entering global markets. These trends generate several difficulties for authorities that typically operate nationally within their national jurisdictions, and, more often than not, have little experience of virtual markets. It is becoming increasingly difficult to assess not only absolute, but also relative tax liability of MNEs. Since the underlying problems are of an international character, they can be dealt only through an international cooperation, including developing countries, and a common technical platform. Lack of fragmentation of information, as well as inherent reliability of records, could provide solutions to a wide range of problems facing monitoring authorities struggling to keep up with information-disseminating effect of globalisation.

In Kenya, the tax collection and administration is done by Kenya Revenue Authority who are mandated to collect taxes on behalf of the government which is then transferred to the

government treasury. The collected amount is used against the budget set by the treasury. The Kenyan tax structure leans heavily towards income taxes and Value Added Taxes (VAT) as the two largest source of total tax revenue. This could be seen for the periods 2005/06 - 2011/12 where income tax contributed 36.3% of total government revenue, while VAT came second, which contributed more than 25% of the revenue in the same period. Contribution by excise duty followed that of VAT, where import duty and other taxes (e.g, stamp duty) accounting for more or less similar percentages (Mutua, 2012).

Tax compliance in Kenya has been low and is mainly as a result of non-declaration of revenue and non-filing especially by SMEs which account for more than 60 percent of economic employment, implies that the government does not generate income tax and VAT from them (Katua, 2014). This is attributed to the fact that SME traders have not been captured by the tax system and it has been difficult to track their transaction. This led to KRA conducting raids in trading areas suspected to have huge non-compliance. This technique has not been effective since the revenue authority does not have adequate manpower for the operations, and it also tends to alienate them from the taxpayers. Some large organizations have also tried to evade tax when some of their economic transactions are not captured by the tax system. Information technology has been able to assist KRA in improving tax compliance and created the potential of further improving compliance if current new techniques are implemented.

1.1.1 I-Tax System

Previously, taxpayers filed their returns manually, filling KRA tax documents and then remit the documents physically at the KRA offices. This created a lot of inconveniences to both taxpayers and the authority with some of the filings getting lost in the process. The

Kenya Revenue Authority introduced the ITMS system in 2010 where filings were done online, but it had challenges in capturing all the transaction data and verification. This did not improve compliance and revenue collection, but only eased the filing process. The consistent tax shortfall led to KRA innovating to the iTax system which is an online filing system by taxpayers. I-Tax system was developed in 2014 to enable taxpayers to submit their tax returns and other related transactions online. It is a web-enabled application system which fully integrates and automates the system for domestic taxes administration (KRA, 2015). Some of the incentives under iTax include enhanced customer service, improvement in tax administration transparency, improved business processes and efficiency, reduced cost in tax administration, and increased level of tax compliance which eventually leads to increased revenue collection (Busaule, 2018). The adoption of iTax improved the revenue collection since more people were becoming compliant due to transaction and taxpayer details capture in the system. The Standard newspaper (2017) indicated that iTax system had greatly simplified tax administration which, in turn, enabled medium-sized firms to file tax returns with ease.

1.1.2 Big Data Analytics

Big data analytics is the process of exploring big data to extract hidden and valuable information and patterns (Russom, 2011). The analytics help organizations and institutions using it to make more informed decisions. With access to vast quantities of data from a range of sources (e.g. financial institutions, utilities, bank transactions, social media data, etc.) both in terms of structured as well as unstructured (text, video, pdfs, etc.), tax authorities can increasingly use big data & advance analytics techniques to conduct audits and uncover trends and discrepancies, using new techniques such as rule-based monitoring, predictive modelling and outlier detection.

For tax compliance purposes, data analytics and mining is used to find patterns indicative of financial fraud by tax authorities. The patterns discovered could be used either to detect or prevent financial fraud (Malaszczyk and Purcell, 2017). According to Gupta (2012), two broad subgroups of data analytics tasks are predictive tasks and descriptive tasks. Predictive tasks are so named because along with machine learning and related technologies these tasks make a prediction for each observation. Descriptive tasks, which include association rules and cluster analysis, describe the data being examined (Gupta, 2012).

Since the introduction of iTax, taxpayers have been filing their returns online which indicate the transaction document and the details therein which include date and value of transaction. This results in a huge database of transactions in the KRA system. A typical transaction includes a buyer and a seller where if a transaction occurs between them, the seller will incur output VAT and the buyer will incur input VAT. With more transactions being input in the iTax system, big data is being generated and it is for KRA to be able to do analytics of the data to identify taxpayers who are not declaring the output VAT. This has started to be implemented by KRA through VAT auto assessment (VAA) which is a system based solution that detects inconsistencies between purchase and sales invoices which have been declared in the VAT returns (Kenya Revenue Authority, 2017).

According to the KRA Sixth Corporate Plan 2015/16-2016/17, the tax collecting institution is at a progressive stage of obtaining a Data Warehouse and Business Intelligence (DWBI) system that will analytically identify data sources (e.g new indicators of compliance and risks can be brought to light by bank records or business licenses),

generate a micro-segmentation of tax payers and differentiate how each segment is treated, and use an approach of test-and-learn when in coming up big data analytics initiatives.

1.1.3 Blockchain Technology

Blockchain technology has the power to disrupt and strongly reorganize accounting and the way tax payments are processed. For example, the payroll tax systems have a significant flaw where there are many government institutions involved and each institution holds their own register, hence duplicating data by other institutions. Implementing a blockchain which is based on a situation where employers will not need to act as intermediaries nor responsible for calculating and transferring tax and social security payments from employee salaries to relevant institutions. This can be done by embedding smart contracts that fully automate the tax calculation and remission process.

In regards to VAT, tax authorities search for ways of more effective VAT collection in order to gain more revenue and shorten the budget gap. On both national and international level, the system is faced with a couple of problems. It is highly reliant on businesses themselves to correctly calculate the amount of VAT due and submit it to the tax authorities, which is a burden especially to SMEs. There are two main reasons for this: tax returns and settlements are calculated over a fixed period and the calculations are not based on actual transactions but rather on arbitrary dates. Blockchain technology will also have an impact on transfer pricing which, according to United Nations, accounts for around 30% of global trade. The laws regulating transfer pricing are different for each country, requiring that cross border transactions between related parties comply with arm's length price. Simply put, this price should mirror the proposed or applied price between non-related parties in an open market.

In Kenya, blockchain technology can be implemented for payroll tax (PAYE), value added tax, and in transfer pricing. This could be done using smart contracts and digital invoice customs exchange (DICE) that is currently used in Europe to curb VAT and transfer pricing frauds.

1.2 Statement of the Problem

The Kenyan government tax targets have not been achieved by the Kenya Revenue Authority in the past few years, which has created shortfalls and budget gaps. According to a publication by The Kenyan Treasury (2019), the government's total revenue collection for the period July 2018 to December 2018 amounted to Kes.794.7 billion compared to the targeted Kes.855.7 billion. This represented an underperformance of Kes.61 billion mainly due to shortfalls in tax collection. For several years, this shortfall created a dilemma for the government on whether to increase the tax rates for both the direct and indirect taxes or the tax base. The government has considered several ways to increase tax collection efficiency in the country, including tough penalties, redesigning the tax structure, and reorganization of the KRA administration structure (Moyi and Ronge, 2006). The use of information technology has also been deployed by KRA, albeit in piecemeal, in a bid to improve efficiency in revenue collection and tax compliance. This included implementation of ETR machine in 2005, introduction of i-Tax system in 2015, and are yet to implement blockchain technology and big data analytics in tax administration. The iTax system was implemented by KRA as an online filing system by taxpayers to ensure online submission of tax returns and other taxation related transactions. It is a web-enabled application system that provides a fully-integrated and automated solution for administration of domestic taxes (KRA, 2015).

The Kenya Revenue Authority indicated in their Sixth Corporate Plan 2015/16-2016/17 that big data and advanced analytics will be facilitated to enhance compliance by taxpayers. In 2018, the government intimated the use of blockchain through data from various sources including telcos, the National Transport and Safety Authority (NTSA) and Kenya Power. With the data, they will be able to view transactions between parties and would increase the number of taxpayers into their system since it would not be possible to falsify transactions.

For the three technologies i.e iTax, data analytics, and blockchain technology, it is only iTax that has been fully implemented but its effect on taxpayer compliance and revenue collection has not been analysed satisfactorily. Blockchain technology and big data analytics, on the other hand, are rather new technologies both globally and locally yet they have an immense potential on businesses and taxation (Frankowski, Baranski and Bronowska, 2017). Since big data analytics and blockchain technology are yet to be fully implemented, the question would be whether they would assist to bridge the deficit on tax collection by KRA in Kenya. The study therefore sought to analyse the effect of information technology on tax compliance in Nairobi, Kenya based on these three technologies.

1.3 Research Objectives

The main objective of the study will be to analyse the effect of information technology adoption by Kenya Revenue Authority on tax compliance in Nairobi, Kenya.

The study's specific objectives were:

i) To determine the effect of i-Tax system by Kenya Revenue Authority on tax compliance in Nairobi, Kenya.

ii) To analyse how use of data analytics by Kenya Revenue Authority has an effect on tax compliance in Nairobi, Kenya.

iii) To analyse how blockchain technology adoption by Kenya Revenue Authority has an effect on tax compliance in Nairobi, Kenya.

1.4 Research Questions

The research questions were:

i) What is the effect of i-Tax system by Kenya Revenue Authority on tax compliance in Nairobi, Kenya?

ii) What is the effect of data analytics use by Kenya Revenue Authority on tax compliance in Nairobi, Kenya?

iii) What is the effect of blockchain technology adoption by Kenya Revenue Authority on tax compliance in Nairobi, Kenya?

1.5 Justification

The study is based on objective of analysing the effect of technology on tax compliance since there has been a big challenge by KRA on how compliance by taxpayers can be improved with various non-technical factors being previously analysed. Also, prior studies on technology used to analyse improvement on tax compliance were only based on iTax system, and none of them looked at the new technologies i.e big data analytics and blockchain analysis. The study will therefore be of importance to various stakeholders including the management of Kenya Revenue Authority, the government, and policy makers.

For the management of KRA, the study will assist in improving tax compliance and hence revenue collection targets set by the treasury. It will also improve the management

efficiency since technology helps achieve more with less resources. The study will also be relevant to the government since they will learn how they can implement the technology to generate more revenue to finance government projects since tax is the biggest source of revenue. The government will also be able to come up with information technology policies that will set the framework for operations by the revenue authority.

The study will be relevant to the general public since it will enable them know how to become tax compliant easily. Implementation of the I.T will bring more taxpayers into the tax bracket help create more equity in tax payment and thereby reduces apathy if tax is paid by majority of taxpayers and not a small group. Finally, the study will be useful to academicians and scholars who would need to advance their knowledge on the subject.

1.6 Scope of the Study

The scope of the study was in Nairobi and specifically The Times Towers, where the researcher could find responses and information pertaining to the study. This scope was considered sufficient since the I.T department is based at Times Towers and was considered adequate for the study. Also, information based on iTax, big data analytics, and blockchain technology would be easily found at Times Towers. The responses and information required for the study was collected from the location and was carried out between September 2019 and October 2019.

1.7 Limitations of the Study

The study had limitations during the research period but did not affect on the quality of the research. Among the limitations encountered in the study is that some of the IT staff members were not be very conversant with the information technology in question and therefore not able to provide adequate answers. This challenge was mitigated by

identifying experienced IT staff members and explaining to the staff what the technology entails so that they can respond adequately. Another limitation experienced through the study was the period taken by the respondents to complete the questionnaire and send them back due to their busy nature of work. This challenge was mitigated by constant communication with the respondents who were able to send back the responses in time.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter carried a review on the theoretical literature, empirical review, and the conceptual framework on the effect of information technology on tax compliance. The purpose of the empirical literature review was to compare and contrast different authors' views on the relationship between the independent variable, information technology and dependent variable, tax compliance. The conceptual framework provided the diagrammatic relationship and operationalization of the variables.

2.2 Theoretical Review

The theoretical review looks at the theories that form the basis of understanding the topic in question: diffusion of innovations theory, technology acceptance model, and united theory of acceptance and use of technology.

2.2.1 Theory of Diffusion of Innovations

Diffusion is the process where certain channels are used to communicate an innovation over a period of time within the members of a social system. An innovation is an idea or practice that is viewed as novel by a person or other unit of adoption. Communication is a process in which participants create and disseminate information within each other in order to reach a consensual agreement (Rogers, 1995). The characteristics of an innovation as perceived by the members of a social system determine its rate of adoption. As indicated in Appendix III, there are three valuable insights offered by diffusion of innovations into the change process: what enables a spread of an innovation, the relevance of peer-to-peer conversations and networks, and understanding the requirements of different user segments. Diffusion of innovations theory views change being mostly about product

evolution or “reinvention” and their behaviours so they become better fits for the requirements of individuals and groups. This theory will assist in analysing the steps taken for innovation in information technology is implemented by Kenya Revenue Authority.

2.2.2 Technology Acceptance Model

Technology Acceptance Model (TAM) was introduced by Fred Davis in 1986 that is specifically tailored for predicting users’ acceptance of information systems or technologies. The aim of the model is to forecast how well a tool is accepted and to determine how modifications can be brought to the system so that users can find it acceptable. The model, as indicated in Appendix III, postulates that a successful adoption of an information system is determined by its perceived usefulness, its perceived ease of use, the users’ attitude towards it, and behavioural intention to use.

Perceived usefulness is defined as the extent to which a user believes that there will be an improvement in performance through the system use. Perceived ease of use is defined as the extent to which a user believes that the use of a system will be effortless. Various studies that used factor analysis have indicated that perceived usefulness and perceived ease of use should be noted as two different factors (Hauser and Shugan, 1980; Larcker and Lessig, 1980). According to Davis (1986), a person’s use of a system is not only determined by an individual’s attitude, but also due to the impact it might have on their performance. This theory will be important for this study as it will show the steps undertaken by KRA management i.e perceive, accept, implement, adopt and use information technology such as big data analytics and blockchain technology.

2.2.3 Unified Theory of Acceptance and Use of Technology

This model was formulated by Venkatesh *et al.* (2003) based on social cognitive theory and it aims to explain a users’ intention to information system usage and subsequent usage

behaviour. The goal of UTAUT is to understand one's intention to use an information system and the actual usage of the system (Venkatesh *et al*, 2003). UTAUT model as shown in Appendix III indicates how behavioural intention and actual use of a system are directly influenced by performance expectancy, effort expectancy, social influence, and facilitating conditions. Moderators that influence the determinants of behavioural intention and use behaviour include gender, age, experience and voluntariness of use.

This model will be relevant to the study as it indicates how variables performance expectancy, effort expectancy, social influence, and facilitating conditions influence the adoption and use of the new information technology, viz, big data analytics and blockchain technology.

2.2.4 Big Data Analytics

Big data analytics can be categorised as descriptive, predictive, and prescriptive (Pyne *et al.*, 2016). Descriptive analytics mines massive data repositories to extract potential patterns existing in the data. Descriptive analytics drills down into historical data to detect patterns like variations in operating costs, sales of different products, customer buying preferences, etc. It summarizes raw data into a human understandable format. Most of the statistical analysis used in day-to-day Business Intelligence (BI) regarding a company's production, financial operations, sales, inventory, and customers come under descriptive analytics (Wolpin, 2006). The descriptive tasks might be types of association rule analysis including multilevel association rules, multidimensional association rules, and quantitative association rules (Thillainayagam, 2012).

Predictive analytics helps to combine massive data from different sources with the goal of predicting future trends or events. Predictive analytics evaluates the future, by forecasting

trends, by generating prediction models, and by scoring. Even though predictive analytics cannot predict with 100% certainty, but it helps the companies in estimating future trends for more informed decision-making. The statistical techniques for these include linear regression, multivariate linear regression, nonlinear regression, and multivariate nonlinear regression, as well as the more complex logistic regression, decision trees, and neural networks (Thillainayagam, 2012).

Prescriptive analytics is a relatively new analytic method and while descriptive and predictive analytics helps to understand the past and predict the future respectively, prescriptive analytics helps to assist professionals in assessing the impact of different possible decisions. It involves techniques such as optimization, numerical modelling, and simulation (Pyne *et al.*, 2016).

2.2.5 Blockchain Technology

Bruyn (2017) defined blockchain as a decentralized, distributed database that is used to maintain a continuously growing list of records, called blocks. Each block contains a timestamp and a link to a previous block. By design and by purpose, blockchains are inherently resistant to modification of the data. Functionally, a blockchain can serve as `an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way (Bruyn, 2017). With a blockchain, other peers must confirm the correctness of the information when one party wants to add a piece of data to the ledger, which in turn is added to a block. Each block has a unique hash that acts as a digital fingerprint of the previous block, linking them together to create a chain of blocks. The technology removes centralization requirement through an intermediary, enabling the sharing of information by parties and directly transact with each other in a safe manner

(Frankowski, Barański and Bronowska, 2017). Moreover, a complete immutability of the ledger is allowed by the use of blockchain technology, since changing the information stored on a block is not possible without altering its hash.

2.3 Conceptual Framework

The conceptual framework operationalizes the variables and shows the relationship of the variables under study. The study used the technology acceptance model (TAM) to determine the effect of information technology on tax compliance.

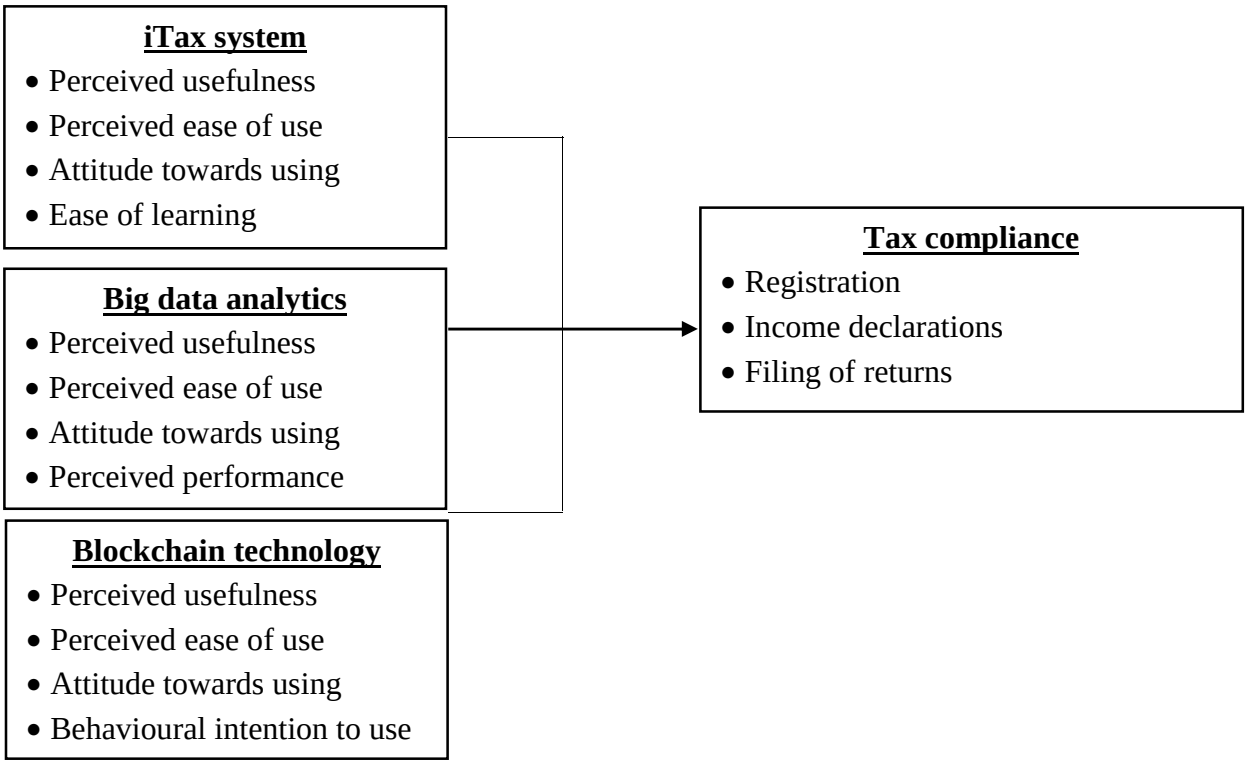

Figure 2.1: Conceptual Framework

The framework indicates the independent and dependent variables used in the study: the independent variables were information technology represented by iTax implementation, big data analytics, and blockchain technology. The independent variables were analysed from the perspective of technology acceptance i.e perceived usefulness, perceived ease of

use, attitude towards using, and intention to use. These variables were analysed to see how they impact on the tax compliance, which is the study's dependent variable. The dependent variable was measured using number taxpayers' registrations, income declaration, and the filing of returns as a result of information technology.

2.4 Empirical Review

Empirical review refers to analysing of previously done empirical studies by a researcher to analyse the findings and make comparisons of the findings with that of the study being done. This study will analyse prior studies done based on the variables; iTax system, data analytics, and blockchain technology.

2.4.1 iTax and tax compliance

Munyoro (2017) did a study to analyse the effect of iTax in compliance of VAT on SMEs in Wote town, Makueni county. The study specifically sought to determine how VAT registration using iTax affect VAT compliance, and whether ICT knowledge on Wote town taxpayer has effect on VAT compliance. The study population comprised of 581 SMEs from Wote sub-county and the study managed to select 120 taxpayers using random sampling technique. The data was analysed using multiple linear regression, where it was found that majority of taxpayers had registered as taxpayers since the introduction of iTax. Registered iTax businesses cited less cost, simplicity and time required as benefits of filing VAT returns online. The study concluded that registration of VAT taxpayers using iTax enhances revenue collection by KRA and reduces possible avenues for tax evasion.

Another study conducted by Kiringa and Jagongo (2016) analysed the impact of online tax filing on tax compliance among SMEs in Kibwezi sub-county in Kenya. The study outlined taxpayers' perception towards online filing, their technical skills of filing tax

returns and tax compliance. The study was based on a descriptive survey research design and the information required for the study collected from primary sources using the self-administered questionnaire and interview schedule. The target population was 1,800 SMEs and a total sample size of 316 SMEs was selected using a simple random sampling technique. A questionnaire was used to collect the data, which was administered to 316 SMEs in Kibwezi sub-county. The study used both descriptive and inferential statistics to analyse the data using t-test analysis. The study findings indicated that online tax filing do affect tax compliance level among MSE as far as perception on online tax filing and technical skills of filing tax returns were concerned. The correlation test results indicated a negative correlation between online tax filing perception and tax compliance while there was a positive correlation among technical skills of filing tax returns.

Malonza (2016) also conducted a study analysing the effect of iTax use on corporation tax compliance by medium corporate taxpayers in Kenya. The compliance was measured in terms of filing, reporting, and payment. The study was done through a descriptive research design where data was collected using a questionnaire that was sent to the taxpayers. The study had a population of 1,500 where 75 taxpayers were selected for the data collection. The study findings indicated that the use of iTax led to enhanced compliance by medium taxpayers in Kenya.

2.4.2 Data analytics and tax compliance

Atanasijevic, Jakovetic and Jerinkic (2018) conducted a study on how big data analytics can be used to improve efficiency in tax collection in the tax administration of the Republic of Serbia. The study was done using descriptive statistics that analysed the risk indicators developed using mathematical models that can be applied to each taxpayer

based on a specific algorithm that was developed and tested on the data. One indicator used the data on monthly net individual income and is based on the assumption that they follow certain patterns and any deviations from the patterns can indicate the risks of tax evasion. The study findings noted that the use of the indicators developed would lead to greater efficiency in tax evasion detection, intended or as a result of reporting mistakes, by better management of tax control activities whose capacities by nature are limited to the control of only certain, small part of taxpayers in a specific period of time.

Pijnenburg, Kowalczyk and Hel-van Dijk (2017) did a study that explored the practicality of data analytics in supervision of taxpayer in The Netherlands, and in detail examining how it contributes to compliance risk management. This study was conducted through a case study of the Netherlands Tax and Customs Administration. From the study findings, they concluded that the basics for tax compliance risk management could be improved through data analytics, which leads to management of a tax administration making more rational decisions. This is more so when tax administrations statistical techniques are successfully used by tax administrations to come up with predictions and make interpretations about cause and effect on compliance risk management which affects taxpayers' behaviour to comply with the rules.

2.4.3 Blockchain technology and tax compliance

Jurgen (2018) presented a paper on how introduction of blockchain technology would have an effect on taxation. The paper indicated that blockchain technology has the capability to disrupt and reorganize accounting and automate the process of payments, transfer and recording of assets. It also noted that the potential of digitizing taxes has been realized by many countries, and new solutions arise, such as SAF-T in Europe or real-time

electronic invoicing in South America. The study stated that blockchain is one of the most promising technologies due to its ability to provide information that is reliable and real-time from many layers to a large audience, similarly as with tax,especially on an international level. It creates opportunities of more certainty to management of tax and minimize the risk of audits and disputes. Specifically, there would be an upfront agreement on the tax records and approach between the various parties in the network. This includes agreements with the tax authorities as part of the blockchain protocols, much as would be in an advanced pricing agreement. When this is combined with a review of a more focused smart contract, greater upfront certainty would limit the required time for audit defence and the requirement to hold reserves to pay the tax disputed.

Ainsworth and Shact (2016) conducted a research on how VAT fraud might be solved by blockchain, analysing case studies of several countries and trade blocs. This was done by analysis of the EU trade block, East Africa Community Trade bloc and Brazil. From the case studies, they indicated that a blockchained DICE system could alter how tax authorities approach the detection of MTIC/MTEC fraud. This would prompt intensive domestic data gathering, frequent record updating, and frequent accuracy checks of local taxpayers a dramatic change from current efforts.

2.5 Critique of Existing Literature

From the previous studies done, research gaps have been identified that this study ought to fill. Some of the empirical studies had limitation in scope of location (Munyoro, 2017; Kiringo and Jagongo, 2016) where they conducted studies in specific counties. The studies were also limited in terms of information technology studied, where they analysed iTax system only (Munyoro, 2017; Kiringo and Jagongo, 2016; Malonza, 2016) as compared

to other information technology factors that this study will analyse. Other empirical studies done had a gap of being conducted in a different economic environment (Atanasijevic *et al*., 2018; Pijnenburg *et al*., 2017; Jurgen, 2018; Ainsworth and Shact, 2016) and were also focused on one aspect of information technology, either data analytics or blockchain technology. The study done will look at the aspect of tax compliance in the whole of Kenya, basing information technology on three aspects: iTax system, data analytics, and blockchain technology.

2.6 Summary of the Literature Review

The chapter started by looking at the theories that are relevant in the adoption of new information technology which were diffusion of innovations theory (DIT), technology acceptance model (TAM), and united theory of acceptance and use of technology (UTAUT). The chapter also presented literature on the variables big data analytics and blockchain technology so as to have an in-depth knowledge of the concept. Thereafter, the chapter provided a conceptual framework that identified variables to be measured, operationalized them and indicated the relationship of the dependent and independent variables. The chapter proceeded to analyse empirical studies of each of the independent variable where prior studies were done, providing the research methodology used together with the study findings. Finally, the chapter identified the research gaps from the empirical studies analysed and how the gap will be filled.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter contains the methodology, which was used in the study. Section 3.2 began with discussion of the overall research design, section 3.3 looked at the study target population, while section 3.4 discussed the sampling frame. Section 3.5 looked at the sampling procedure which was used to arrive at the appropriate sample size. Section 3.6 presented the data collection instrument and techniques that were used in data collection and the justification for the choices while section 3.7 looked at the pilot test of the research instrument. Data analysis and presentation was contained in Section 3.8.

3.2 Research Design

Bryman and Bell (2007) defined research design as a general plan which provides a framework to be used for data collection techniques and data analysis procedures. The study employed a descriptive survey study analysis design because it gives a good description and understanding of phenomenon under study. The study analysed responses of staff at Kenya Revenue Authority located at Times Towers building.

3.3 Target Population

Target population refers to the total number of individuals or items from which a sample might be drawn. The study's target population was all the staff at the Kenya Revenue Authority who are based at The Times Towers. From the KRA Sixth Corporate Plan, the total number of staff at Kenya Revenue Authority in the whole of Kenya was 4,629 as at June 2015. The target population was sought from KRA staff at Times Towers since they were easily accessible and was approximated to be 830 in all departments.

3.4 Sampling Frame

The sampling frame defines a set of elements from where a sample of the target population can be selected from by a researcher (Turner, 2003). It lists all the items in the target population. The study's sampling frame was the I.T department at K.R.A from where the sample was selected. The sampling frame included all the I.T staff members based at K.R.A since they are easily accessible and they were able to respond adequately to the topic under study.

3.5 Sampling and Sampling Techniques

Sampling is the process of selecting units from a target population so that the characteristics found from the sample can be inferred to the population (Creswell, 2012). The study used purposive sampling technique which is a non-probabilistic sampling technique that identified respondents based on the judgement of the researcher on who is qualified to answer the research questions. A sample size is based on the purpose of the study, population size, precision level and the confidence level (Israel, 2003). Since the number of the I.T staff was not large and approximate to be roughly 65 in number, the study used a sample rate of 70 percent to select the respondents who qualify to answer the research questions. From this, the sample size was 46 respondents who provided an in-depth analysis on the effect of information technology on tax compliance.

3.6 Data collection instrument

The study used primary data to collect data to answer the research questions. Data was collected using semi-structured questionnaires. The questionnaire was part structured to provide uniformity in answers and make analysis easy in order to answer the research questions and part unstructured where respondents can provide information that might not have been asked or could not be explained in a structured response. Questionnaires are

relevant tools for primary collection since they provide relevant information from the people relevant to the study and therefore provided first-hand information for analysis. Mugenda and Mugenda (2003) stated that questionnaires give a detailed answer to complex problems. Additionally, questionnaires are also a popular method for data collection in deduction because of the relative ease and cost-effectiveness with which they are constructed and administered.

3.7 Data collection procedure

The questionnaires were sent to I.T department staff at Kenya Revenue Authority through emails and in situations where the email is not known, a hardcopy of the questionnaire was physically sent to them for filling. The soft copy of the questionnaire sent to them was in form of a fillable pdf document which could be filled and saved, then sent back for analysis. There were several communications with the respondents on the progress of the questionnaire filling so as to stick to the project timetable.

3.8 Pilot Testing

A good measurement tool should pass the tests of validity and reliability, which are the key considerations used in evaluating a measurement tool. This is to ensure the data collected assisted in effectively answering the research questions. The measurement tool was a questionnaire and was pilot-tested for validity and reliability.

3.8.1 Validity Test

Berg and Gall (1989) defined validity as the degree by which a study's test sample items represents the items which the test is intended to measure. Validity of the instrument was conducted through a pre-test. In this study, validity was analysed using one or more of the following validity constructs: face validity which established that the measure appears to be evaluating the intended construct under study. The instrument validity was tested by

doing a pre-test amongst 10 percent of the target population, which was 7 respondents, as well as expert analysis who confirmed the adequacy of the instrument.

3.9 Data Analysis and Presentation

Data analysis is the process of creating order, structure and meaning to the collected data (Marshall and Rossman, 2016). In this stage, the collected data was analysed using SPSS which used both descriptive and inferential statistics to analyse the data. The descriptive statistics included the mean and standard deviation while inferential statistics used quantitative content analysis.

The study employed multiple linear regression analysis in its data analysis. Regression analysis was used to analyse the effect of information technology on tax compliance.

The formula used for regression analysis was:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon \quad \text{(i)}$$

Where:

Y = Tax compliance

X_1 = iTax system

X_2 = Big data analytics

X_3 = Blockchain technology

$\beta_1, \beta_2, \beta_3$ = the independent variable coefficients

a = the constant of the regression.

ε = the residual or error term

The significance of the data was analyzed using critical p-values. The resulting p-values were compared with the critical p-value from the table at 5 percent significance value. Values within the 5 percent significance value were considered statistically significant

while calculated values above were rejected. The analysed data was presented in tables which was then interpreted for users understanding.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

The objective of the study was to analyse the effect of information technology on tax compliance in Kenya whose outlay is as follows: Section 4.2 of the chapter contains the summary statistics which is the descriptive statistics and the response rate, followed by the inferential statistics which is contained in section 4.3 of the chapter. Finally, the discussion of the findings was presented in section 4.4 of the chapter.

4.1.1 Reliability Test

Shanghverzy (2003) defined reliability as the measurement consistency of a collection tool and is commonly assessed through the test-retest reliability method. It indicates the relationship between the research data and the variable measured (Mugenda and Mugenda, 2003). It is thus the consistency and dependability of collected data through the use of an instrument repeatedly or data collection procedure under same circumstances. Cronbach-Alpha test was used for testing data reliability whose values range between 0 and 1, with acceptable values to be considered from this test being 0.7 and above.

Table 4.1: Reliability Test

Cronbach's Alpha	No of variables
.726	4

The reliability test used three variables, registration of taxpayers, income declaration by taxpayers, and filing of returns by taxpayers. The Cronbach's Alpha test indicated a value of 0.726 which indicated that the data collected was reliable for analysis.

4.2 Descriptive Statistics

4.2.1 Response Rate

With the objective of the study being to determine the effect of information technology on tax compliance at Kenya Revenue Authority, questionnaires were sent to the 54 respondents working in the county and 46 respondents responded by sending back the questionnaires. This gave the study a response rate of 85.18 percent with the other 14.82 percent not responding either because they were not in a position to give the company information or could not answer the questionnaire in time as required by the study.

4.2.2 Descriptive Data

Table 4.2: Number of years working at KRA

	N	Minimum	Maximum	Mean	Std. Deviation
No. of years at KRA	33	3	12	8.67	3.541
Valid N (listwise)	33				

Table 4.2 above describes the number of years of the respondents working in the I.T department at Kenya Revenue Authority. From the table, the average age of workers in the I.T department is 8.67 years, with the minimum work experience being 3 years while the maximum number of years being 12 years. The average years of employment at KRA shows that the employees at the I.T department have experience in information technology and there is a blend of experience ranging from 3 years to 12 years.

Table 4.3: Adequacy of information technology to enhance compliance

		Frequency	Percent	Cumulative Percent
Valid	No	2	6.1	6.1
	Yes	31	93.9	100.0
	Total	33	100.0	

Table 4.3 above provided the responses on whether Kenya Revenue Authority has adequate information technology to improve tax compliance of taxpayers. This was

indicated using percentage and the corresponding frequency indicated by N. From the table, 93.9% (N=31) of the responses indicated that K.R.A has adequate information technology to enhance tax compliance while only 6.1% (N=2) of the respondents indicated that K.R.A does not have adequate information technology to enhance tax compliance by taxpayers.

4.3 Effect of information technology on tax compliance

Table 4.4: Effect of information technology on tax compliance

N	Valid	33
	Missing	0
Mean		4.09
Std. Deviation		.631

		Frequency	Percent	Cumulative Percent
Valid	Moderate Extent	5	15.2	15.2
	Great Extent	20	60.6	75.8
	Very Great Extent	8	24.2	100.0
	Total	33	100.0	

The study also analysed from the respondents the extent to which information technology affects tax compliance in Kenya and was indicated in Table 4.4 above. This was indicated using percentage and the corresponding frequency indicated by N. From the responses, 60.6% (N=20) of the respondents indicated that information technology in general affects tax compliance to a great extent, 24.2% (N=8) of them indicated that it affects tax compliance to a very great extent. Only 15.2% (N=5) of the respondents indicated that information technology affects tax compliance to a moderate extent. The finding therefore shows that information technology in general has an effect on tax compliance to a great extent since 84.8% (N=28) responded either to a great extent or to a very great extent and the mean of the responses being 4.09 which implies an effect to a very great extent.

4.3 Effect of Information Technology on Tax Compliance

The study analysed the effect of information technology on tax compliance through registration of taxpayers, returns filing by taxpayers, and income declaration by taxpayers. This was done by using frequency distributions where the descriptive statistics was computed.

Table 4.5: Descriptive statistics on effect of information technology on tax compliance

	Taxpayer registration	Taxpayers' filing	Income declaration
Mean	4.06	4.30	3.97
Std. Deviation	.496	.529	.585

Table 4.5 above shows the descriptive statistics on effect of information technology on tax compliance. The findings in regards to taxpayers' registration indicated a mean of 4.06 with a standard deviation of 0.496, that of taxpayers' filing had a mean of 4.30 with standard deviation of 0.529, and declaration of income had a mean of 3.97 with a standard deviation of 0.585. This implied that information technology affects taxpayers' registration and taxpayers' filing to a great extent while it affects income declaration to a moderate extent. The frequency distribution was provided as below:

4.3.1 Registration of taxpayers

Table 4.6: Registration of taxpayers

		Frequency	Percent	Cumulative Percent
Valid	Neutral	3	9.1	9.1
	Agree	25	75.8	84.8
	Strongly Agree	5	15.2	100.0
	Total	33	100.0	

Table 4.6 indicates the frequency distribution on whether information technology in general improved the registration of taxpayers in Kenya. The findings indicated that

75.8% (N=25) of the respondents agreed that there are more taxpayers' registration as a result of information technology adoption while another 15.2% (N=5) of them strongly agreed on the same. Only 9.1% (N=3) of the respondents neither agreed nor disagreed that there is improved taxpayers' registration as a result of information technology. The descriptive statistics indicated a mean of 4.06 and a standard deviation of 0.496 which reaffirmed that there is improved taxpayers' registration as a result of use of information technology.

4.3.2 Returns filing by taxpayers

Table 4.7: Returns filing by taxpayers

		Frequency	Percent	Cumulative Percent
Valid	Neutral	1	3.0	3.0
	Agree	21	63.6	66.7
	Strongly Agree	11	33.3	100.0
	Total	33	100.0	

Table 4.7 above presented the frequency distribution on whether taxpayers are filing more returns due to adoption of information technology. The findings indicated that 63.6% (N=21) of the respondents agreed that taxpayers are filing their returns in time as a result of information technology by K.R.A, while another 33.3% (N=11) strongly agreed to the same. This is a total of 97% of the total respondents who either agreed or strongly agreed indicating that information technology indeed enabled taxpayers file their returns in time. This is also substantiated by the overall mean of 4.30 and a standard deviation of 0.585 which implied that they strongly agreed that taxpayers are filing their returns as a result of information technology.

4.3.3 Taxpayers Income Declaration

Table 4.8: Taxpayers Income Declaration

		Frequency	Percent	Cumulative Percent
Valid	Neutral	6	18.2	18.2
	Agree	22	66.7	84.8
	Strongly Agree	5	15.2	100.0
	Total	33	100.0	

Table 4.8 above presented the frequency distribution on whether taxpayers are declaring more income as a result of implementation of information technology. From the findings, 66.7% (N=22) of the respondents agreed that taxpayers are declaring more income as a result of information technology, while another 15.2% (N=5) strongly agreed on the same. There was 18.2% (N=6) of the respondents who were neutral on whether taxpayers are declaring more income as a result of information technology. The descriptive statistics indicated a mean of 3.97 and a standard deviation of 0.529 which implied that they agreed that taxpayers are declaring more income as a result of information technology.

4.3.4 Information Technology Usage

The information system usage was measured using ordinal scale ranging from 1 which represented strongly disagree and 5 which represented strongly disagree. The mean of the responses was interpreted using the same ordinal scale where a mean ranging from 0 to 1 represented strongly disagree and that ranging between 4 and 5 represented strongly agree.

A. iTax System

The iTax system has been in use by Kenya Revenue Authority and the study sought to find whether it has an effect on tax compliance. This was analysed using descriptive statistics such as mean and standard deviation. The study also analysed the mean of the responses that were in ordinal scale ranging from the least of 1 to highest of 5.

Table 4.9: Descriptive Statistics on iTax System

	Itax_Extent1	Itax_Extent2	Itax_Extent3	Itax_Extent4	Itax_Extent5
Mean	4.33	4.03	3.88	4.09	4.24
Std. Deviation	.479	.637	.740	.631	.614

Table 4.9 highlights the means and standard deviations of the responses, which indicated means of 4.33 for iTax being useful in enabling online returns, 4.03 for iTax being easy to use by KRA staff and taxpayers, 3.88 for iTax system improving the performance at work, 4.09 for ease of learning iTax system, and 4.24 for recommending use of iTax system. The frequency distribution is as indicated below:

i) iTax system is useful in enabling taxpayers file returns online

Table 4.10: iTax is useful in enabling taxpayers file return online

		Frequency	Percent	Cumulative Percent
Valid	Agree	21	63.6	63.6
	Strongly Agree	12	36.4	100.0
	Total	33	100.0	

Table 4.10 provided the frequency by respondents on whether iTax system is useful in enabling taxpayers file their returns online. From the responses, 63.6% (N=21) of the respondents agreed that iTax system enables taxpayers to file their returns online while the other 36.4% (N=12) greatly agreed that iTax is useful in enabling taxpayers filing return online. The descriptive statistics indicated a mean of 4.33 which also indicated that they greatly agree that iTax enables taxpayers file return online. The findings indicate that taxpayers are finding iTax useful in filing their returns online since all respondents who are I.T staff at K.R.A agreed or strongly agreed to the same.

ii) iTax is easy to use by KRA staff and taxpayers

Table 4.21: iTax is easy to use by KRA staff and taxpayers

		Frequency	Percent	Cumulative Percent
Valid	Neutral	6	18.2	18.2
	Agree	20	60.6	78.8
	Strongly Agree	7	21.2	100.0
	Total	33	100.0	

The study also presented the frequency in Table 4.11 indicating whether it is easy to use iTax by both K.R.A staff and taxpayers. From the responses, 60.6% (N=20) of the respondents agreed that it is easy to use the iTax while another 21.2% (N=7) of the respondents strongly agreed that iTax system is easy to use by both KRA staff and taxpayers. The remaining 18.2% (N=6) of the respondents neither agreed nor disagreed as to whether iTax system is easy to use by both KRA staff and taxpayers. The descriptive statistics indicated a mean of 4.03 and a standard deviation of 0.637 which also showed that respondents strongly agreed that iTax system is easy to use by K.R.A staff and taxpayers.

iii)iTax system improves the performance at work

Table 4.32: iTax system improves the performance at work

		Frequency	Percent	Cumulative Percent
Valid	Disagree	1	3.0	3.0
	Neutral	8	24.2	27.3
	Agree	18	54.5	81.8
	Strongly Agree	6	18.2	100.0
	Total	33	100.0	

Table 4.12 highlighted the frequency by respondents on whether iTax system improves their performance of work. From the responses, 54.5% (N=18) of the respondents agreed

that iTax system improves their performance at work and another 18.2% (N=6) of the respondents strongly agreed that iTax system improves their performance at work. Only 24.2% (N=8) of the respondents were neutral on whether iTax system improves their performance at work. The descriptive statistics indicated a mean of 3.88 and a standard deviation of 0.74 which indicated that the I.T staff members at K.R.A agreed that iTax system improves their performance at work.

iv) Learning to use iTax system is easy

Table 4.43: Learning to use iTax system is easy

		Frequency	Percent	Cumulative Percent
Valid	Neutral	5	15.2	15.2
	Agree	20	60.6	75.8
	Strongly Agree	8	24.2	100.0
	Total	33	100.0	

Table 4.13 highlighted the frequency by respondents on how easy it is to learn the iTax system at work. From the responses, 60.6% (N=16) of the respondents agreed that learning to use iTax system is easy, with another 24.2% (N=8) of them strongly agreeing the same. Only 15.2% (N=5) of the respondents were neutral on whether learning to use iTax system is easy. From the descriptive statistics, the mean of the responses was 4.09 with a standard deviation of 0.631 which showed that in general the respondents greatly agreed that learning to use iTax system is easy.

v) I would recommend use of iTax system at work

Table 4.54: I would recommend use of iTax system at work

		Frequency	Percent	Cumulative Percent
Valid	Neutral	3	9.1	9.1
	Agree	19	57.6	66.7
	Strongly Agree	11	33.3	100.0
	Total	33	100.0	

Table 4.14 above presented the frequency by respondents on whether they would recommend the use of iTax system at their work place. From the responses, 57.6% (N=19) of the respondents agreed that they would recommend the use of iTax system, with another 33.3% (N=11) of them greatly agreeing that they would recommend the use of iTax system at work. Only 9.1% (N=3) of the respondents were not sure on whether to recommend iTax system or not. The findings showed that most staff members would recommend the use of iTax system since 90.9% of the respondents either agreed or greatly agreed to recommend, and also the general mean of responses indicated a mean of 4.24 and standard deviation of 0.614.

B. Data Analytics

The use of data analytics has been used for some time now by Kenya Revenue Authority and the study sought to determine its effect on tax compliance. This was done by analyzing the descriptive statistics of the responses as shown in Table 4.14 below, and the frequency distributions.

Table 4.65: Descriptive statistics on data analytics

	Data Analytics 1	Data Analytics 2	Data Analytics 3	Data Analytics 4	Data Analytics 5
Mean	3.91	3.55	3.52	3.85	3.97
Std. Deviation	.637	.810	.833	.667	.637

Table 4.15 highlights the means and standard deviations of the responses, which indicated means of 3.91 for data analytics being useful at work, 3.55 for data analytics being easy to learn and use by staff, 3.52 for data analytics improving productivity at work, 3.85 for data analytics making it easy to perform work, and 3.97 for recommending use of data analytics. The frequency distribution is as indicated below:

i) Use of data analytics is useful in my work

Table 4.76: The use of data analytics is useful in my work

		Frequency	Percent	Cumulative Percent
Valid	Neutral	9	27.3	27.3
	Agree	18	54.5	81.8
	Strongly Agree	6	18.2	100.0
	Total	33	100.0	

Table 4.16 provides the frequency distribution on whether data analytics is useful in the work of KRA employees. From the responses, 54.5% (N=18) of the respondents agreed that data analytics is useful in their work while 18.2% (N=6) of them strongly agreed that data analytics is useful in their work. Only 27.3% (N=9) of the I.T staff neither agreed nor disagreed as to whether data analytics is useful in their work. The descriptive statistics table also indicated a mean of 3.91 and a standard deviation of 0.637 indicating that in overall the I.T staff members agree that iTax is useful in their work.

ii) Data analytics is easy to learn and use by staff

Table 4.87: Data analytics is easy to learn and use by staff

		Frequency	Percent	Cumulative Percent
Valid	Disagree	4	12.1	12.1
	Neutral	9	27.3	39.4
	Agree	18	54.5	93.9
	Strongly Agree	2	6.1	100.0
	Total	33	100.0	

Table 4.17 provided the frequency on whether data analytics is easy to learn and use by staff members at Kenya Revenue Authority. From the study findings, 54.5% (N=18) of the respondents agreed that it is easy to learn and use data analytics by I.T staff at K.R.A while another 27.3% (N=9) of them neither agreed nor disagreed as to whether it is easy to learn and use data analytics. The responses also indicated that 12.1% (N=4) of the I.T staff disagreed on data analytics being easy to learn and use. The findings through the descriptive statistics indicated an overall mean of 3.55 which imply that they agreed that data analytics is easy to learn and use. The findings indicated a mixed response since there are also staff members who disagreed that data analytics is easy to learn and use.

iii)Use of data analytics improves productivity at work

Table 4.98: Use of data analytics improves productivity at work

		Frequency	Percent	Cumulative Percent
Valid	Disagree	4	12.1	12.1
	Neutral	10	30.3	42.4
	Agree	16	48.5	90.9
	Strongly Agree	3	9.1	100.0
	Total	33	100.0	

Table 4.18 highlighted the frequency by respondents on whether data analytics improves productivity at work. From the responses, 48.5% (N=16) of the respondents agreed that use of data analytics improves productivity at work while 30.3% (N=10) of them were not sure on whether data analytics improves their productivity at work. Only 12.1% (N=4) of them disagreed on whether data analytics improves their productivity at work. The descriptive statistics indicated a mean of 3.52 which also indicated that the I.T staff members at K.R.A agreed that data analytics improve their productivity at work.

iv) Data analytics makes it easy to perform work

Table 4.109: Data analytics makes it easy to perform work

		Frequency	Percent	Cumulative Percent
Valid	Neutral	10	30.3	30.3
	Agree	18	54.5	84.8
	Strongly Agree	5	15.2	100.0
	Total	33	100.0	

Table 4.19 highlighted the frequency by respondents on whether data analytics makes it easy for them to perform work. From the responses, 54.5% (N=18) of the respondents agreed that use of data analytics makes it easier for them to perform work while another 15.2% (N=5) of them strongly agreed to the same. Another 30.3% (N=10) of the respondents neither agreed nor disagreed to whether data analytics makes it easier for them to perform at work. The descriptive statistics indicated a mean of 3.85 with a standard deviation of 0.637 which also indicated that the I.T staff members at K.R.A agreed that data analytics makes it easier to perform their work.

v) I greatly recommend use of data analytics at work

Table 4.20: I greatly recommend use of data analytics at work

		Frequency	Percent	Cumulative Percent
Valid	Neutral	7	21.2	21.2
	Agree	20	60.6	81.8
	Strongly Agree	6	18.2	100.0
	Total	33	100.0	

Table 4.20 above highlights the frequency by respondents on whether they would recommend the use of data analytics at work. From the responses, 60.6% (N=20) of the respondents agreed that they would recommend the use of data analytics at work and another 18.2% (N=6) of them strongly agreeing to recommendation of data analytics at work. The findings also indicated 21.2% (N=7) of the respondents being neutral on whether to recommend use of data analytics or not. The descriptive statistics indicated a mean of 3.97 and a standard deviation of 0.637 which also indicated that the I.T staff members at K.R.A agreed to recommend the use of data analytics at work.

C. Blockchain Technology

The implementation of blockchain technology is in its initial stages by Kenya Revenue Authority and the study sought to determine its effect on tax compliance. This was done by analyzing the descriptive statistics of the responses as shown in Table 4.20 below, and the frequency distributions.

Table 4.111: Descriptive Statistics on blockchain technology

	Blockchain 1	Blockchain 2	Blockchain 3	Blockchain 4	Blockchain 5
Mean	3.30	2.94	3.79	3.76	3.85
Std. Deviation	.847	1.029	.893	.740	.906

Table 4.21 highlights the means and standard deviations of blockchain technology responses, which indicated means of 3.30 for blockchain technology being important in improving tax compliance, 2.94 for blockchain technology being easy to use by staff, 3.79 for blockchain technology improving productivity at work, 3.76 for blockchain technology making work performance easier, and 3.85 for recommending use of blockchain technology. The frequency distribution is as indicated below:

i) Blockchain technology is important in improving tax compliance

Table 4.122: Blockchain technology is important in improving tax compliance

		Frequency	Percent	Cumulative Percent
Valid	Disagree	8	24.2	24.2
	Neutral	8	24.2	48.4
	Agree	17	51.6	100.0
	Total	33	100.0	

Table 4.22 above highlighted the frequency by respondents on whether blockchain technology is important in improving tax compliance. From the responses, 51.6% (N=17) of the respondents agreed that use of blockchain technology is important in improving tax compliance while the respondents either disagreed or were neutral equally, each at 24.2% (N=8) on whether blockchain technology is important in improving tax compliance. The descriptive statistics indicated a mean of 3.27 which also indicated that the I.T staff members at K.R.A agreed that blockchain technology is important in improving tax compliance.

ii) Blockchain technology is easy to use by staff

Table 4.133: Blockchain technology is easy to use by staff

		Frequency	Percent	Cumulative Percent
Valid	Strongly Disagree	3	9.1	9.1
	Disagree	9	27.3	36.4
	Neutral	8	24.2	60.6
	Agree	13	39.4	100.0
	Total	33	100.0	

Table 4.23 presented the frequency distribution by respondents on whether blockchain technology is easy to use by staff at K.R.A. From the responses, 39.4% (N=13) of the respondents indicated that use of blockchain technology is easy, while a total of 36.4% either disagreeing or strongly disagreeing with 27.3% (N=9) and 9.1% (N=3) respectively. There were also 24.2% (N=8) of the respondents who neither agreed nor disagreed whether blockchain technology is easy to use. The descriptive statistics indicated a mean of 2.94 and a standard deviation of 1.029 which also implied that in general the I.T staff members at K.R.A were neutral on whether blockchain technology is easy to use and varied opinion due to the standard deviation.

iii)Blockchain technology improves productivity at work

Table 4.144: Blockchain technology improves productivity at work

		Frequency	Percent	Cumulative Percent
Valid	Disagree	3	9.1	9.1
	Neutral	8	24.2	33.3
	Agree	15	45.5	78.8
	Strongly Agree	7	21.2	100.0
	Total	33	100.0	

Table 4.24 highlighted the frequency distribution by respondents on whether blockchain technology improves productivity at work. From the responses, 45.5% (N=15) of the respondents agreed that blockchain technology improves productivity at work, with another 21.2% (N=7) strongly agreeing on the same. The responses also indicated 9.1% (N=3) of the respondents disagree that blockchain technology improves productivity at work and 24.2% (N=8) of them neither agreeing nor disagreeing to the same. The descriptive statistics also indicated a mean of 3.79 and a standard deviation of 0.893 which implied that agree to blockchain technology improving technology at work.

iv) Blockchain technology makes work performance easy

Table 4.155: Blockchain technology makes work performance easy

		Frequency	Percent	Cumulative Percent
Valid	Disagree	1	3.0	3.0
	Neutral	10	30.3	33.3
	Agree	17	51.5	84.8
	Strongly Agree	5	15.2	100.0
	Total	33	100.0	

Table 4.25 presented the frequency distribution by respondents on whether blockchain technology makes work performance easy. The responses indicated that 51.5% (N=17) of the respondents agreed that blockchain technology makes work performance easy with another 15.2% (N=5) strongly agreeing to the same. The findings also showed that 30.3% (N=10) of the respondents neither agreeing nor disagreeing to whether blockchain technology makes work performance easy. The descriptive statistics indicated a mean of 3.76 and a standard deviation of 0.74 which also indicated that the respondents agreed that blockchain technology makes work performance easy.

v) I recommend use of blockchain technology at work

Table 4.166: I recommend use of blockchain technology at work

		Frequency	Percent	Cumulative Percent
Valid	Disagree	4	12.1	12.1
	Neutral	4	12.1	24.2
	Agree	18	54.5	78.8
	Strongly Agree	7	21.2	100.0
	Total	33	100.0	

Table 4.26 highlighted the frequency by respondents on whether they would recommend use of blockchain technology at work. From the given responses, 54.5% (N=18) of the respondents agreed that they would recommend use of blockchain technology, while another 21.2% (N=7) of the respondents strongly agreeing to recommend blockchain technology. Only 24.2% of the respondents were either neutral or disagreed to recommend to the use of blockchain technology with each having 12.1% (N=4). The descriptive statistics indicated an overall mean of 3.85 and a standard deviation of 0.906 which also indicated that the respondents would agree to recommend use of blockchain technology.

4.3.5 Results of Model Goodness of Fit Test

Table 4.177: Goodness of Fit Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.659[a]	.434	.419	.241

a. Predictors: (Constant), iTax system, data analytics, blockchain technology

Table 4.27 above shows the *R*, R^2, and the standard error of the estimates. *R* represents the multiple correlation coefficients, while R^2 represents the proportion of variance in the dependent variables that can be explained by the independent variables. As shown in Table 4.8, *R* indicated a value of 0.659, while adjusted R^2 indicated a value of 0.434, and a standard error estimate of 0.241. The adjusted R^2 is used for multiple regression analysis

and it indicated that there was a variance of 41.9% on tax compliance as a result of iTax system, data analytics, and blockchain technology. The table also indicated an overall correlation coefficient of 0.659 indicating that there is a moderately strong relationship between the dependent and independent variables.

4.3.6 Results of ANOVA

Table 4.188: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.753	3	2.918	15.125	.047[a]
	Residual	1.554	8	.194		
	Total	10.308	11			

a. Predictors: (Constant), iTax system, Data Analytics, Blockchain technology

b. Dependent Variable: Tax compliance

The ANOVA table tested whether the overall regression model is a good fit for the data, and whether the independent variables statistically predict the dependent variable significantly. It tests the statistical significance of the test. The F test has two numbers for its degrees of freedom and from the table, $F(3,8) = 15.125$ and p value $(0.47) < 0.05$. This indicated that the regression model is significant in predicting tax compliance.

4.3.7 Estimated Model

Table 4.199: Regression Coefficients

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.632	2.217		.285	.463
	iTax system	.571	.223	.177	2.560	.037
	Data analytics	.125	.061	.265	2.049	.044
	Blockchain technology	.016	-.101	-.052	-1.584	.180

a. Dependent Variable: Tax compliance

The regression coefficients table indicates the unstandardized and standardized coefficients of the variables. Table 4.29 above indicated standardized coefficients for the variables: iTax system had a standardized beta coefficient of 0.177 and a significance value of 0.047, data analytics had a standardized beta coefficient of 0.265 and a significance value of 0.061, blockchain technology had a standardized beta coefficient of -0.052 and a significance value of 0.18, while the constant had a coefficient of 0.632 and a significance value of 0.463. The significance value analyses whether the individual variables are significant in affecting tax compliance at 5 percent level. The significance value of 0.047 for iTax system indicated that it is statistically significant in predicting tax compliance, data analytics had a significance value of 0.044 implying it is a good predictor, while blockchain technology had significance values of 0.18 indicating it does not adequately predict tax compliance at 5 percent level.

From these coefficient variables indicated, the equation can be stated as:

$$Tax\ compliance = 0.632 + (0.177 * X_1) + (0.265 * X_2) - (0.052 * X_3)$$

This equation indicates that an ordinal unit of tax compliance requires increase of 0.177 units of iTax system usage, increase of 0.265 units of data analytics usage, and a decrease of 0.052 units of blockchain technology and a constant of 0.632.

4.4 Discussion

The analysis looked at implementation of information technology and how they have an effect on tax compliance. The information technology variables analysed were iTax system, data analytics, and blockchain technology. The study analysed the adoption of information technology and how they have an effect on tax compliance. This was done on various aspects of iTax system, data analytics, and blockchain technology. In regards to

iTax system, the study found that the system was useful in enabling taxpayers file returns online with a response mean of 4.33, while it was staff and taxpayers also found use of the system to be easy with a mean of 4.03. In regards to improving performance at work, the study findings indicated the respondents agreeing with a mean of 3.88 and a mean of 4.09 in terms of ease of learning the iTax system. Finally, in terms of iTax system, the findings indicated that staff members would strongly recommend the system with a mean of 4.24. The findings in regards to iTax system showed that iTax system has a positive acceptance and adoption since it had lowest mean of 3.88 and the highest mean of 4.24. This indicated that iTax has an effect on tax compliance to a great extent.

Regression analysis test was conducted to determine the extent of relationship between the tax compliance and information technology. The adjusted R^2 was 0.434 or 43.4% which indicated the variance of tax compliance for increase in the information technology. This value indicates that there might be other variables that cause the other 43.4% of the variance in tax compliance. The ANOVA of the study indicated an F value of 15.125 and a p-value of 0.047. This indicated that the independent variables were significant in terms of goodness of fit since the p value of 0.047 is less than the significant value of 0.05.

The first independent variable was iTax system with a coefficient of 0.177 and a t value of 2.56. This together with the significance value of 0.037 indicated that the variable had a significant impact to tax compliance. This outcome is consistent with that of Munyoro (2017), Kiringa and Jagongo (2016), and that of Malonza (2016) who indicated that iTax system enhances tax compliance. The second variable in the study was big data analytics which had a standardised coefficient of 0.265, a t-value of 2.049, and a significance value of 0.044. The findings indicated that big data analytics had a significant effect on tax

compliance. The study findings were also consistent with that done by Atanasijevic, *et al*. (2018) who indicated that big data analytics would lead to greater efficiency in tax evasion detection, intended or as a result of reporting mistakes, by better management of tax control activities.

Blockchain technology was the third and final independent variable in the study which had a coefficient value of -0.052, a t-value of -1.584, and a significance value of 0.18. The findings indicated that blockchain technology does not have significant effect on tax compliance at 5 percent level since the significance value 0.18 is greater than p-value of 0.05. The findings are not consistent with that Jurgen (2018) and Ainsworth and Shact (2016) whose findings indicated that blockchain had an effect on taxation and VAT respectively.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This final chapter presents the summary, study conclusions together with recommendations regarding the effect of information technology on tax compliance in Nairobi, Kenya. Section 5.2 presented the study summary, while section 5.3 presented the conclusion of the study based on the findings results, and finally the study's managerial and policy recommendations were provided in section 5.4.

5.2 Summary

The government has been experiencing budgetary shortfalls and Kenya Revenue Authority as the mandated tax collection body has faced challenges in meeting the revenue collection targets set by the treasury. One of the reasons for the revenue collection shortfall is due to low tax compliance in the country and the revenue authority has been looking for ways to improve tax compliance. The use of information technology has been one of the ways that K.R.A as it tries to identify more taxpayers and seal tax evasion and loopholes. The tax authority has for some time used the iTax system which is an online tax filing platform, and recently introduced data analytics systems such as VAT Auto Assessment (V.A.A) that is integrated with the iTax system to find taxpayers and transaction patterns so as to easily identify tax gaps. The tax authority is in the process of introducing blockchain technology through Tax Invoice Management System (TIMS) in order seal to seal loopholes and improve compliance. Through these technologies, the study sought to determine the effect of information technology (iTax system, data analytics, and blockchain technology) on tax compliance in Nairobi, Kenya. The data was collected from K.R.A staff in the I.T department through a questionnaire.

From the data analysis done through descriptive statistics, the study findings indicated that information technology in general has a great effect on tax compliance with a mean of 4.09 since many of the respondents either agreeing or strongly agreeing that I.T has an effect on tax compliance. For the individual independent variables and their effect on tax compliance, the study findings indicated several outcomes.

5.2.1 iTax System

The study's first objective was to determine the effect of iTax system by Kenya Revenue Authority on tax compliance in Nairobi, Kenya. Descriptive statistics indicated that iTax system has a significant effect on taxpayers' registration, income declaration, and filing of returns with means greater than 4.0. The findings also indicated that iTax system is useful in enabling taxpayers file returns online, improves performance at work, is easy to use by staff and taxpayers, and also easy to learn to use. This was through the responses which either agreed or strongly agreed with the statements. Regression analysis indicated that iTax system has an effect on tax compliance based on the significance value of 0.037 which was less than the 5 percent significance value.

5.2.2 Data Analytics

The second objective of the study was to analyse the effect of data analytics by Kenya Revenue Authority on tax compliance in Nairobi, Kenya. The findings indicated that data analytics is useful to employees at work, the technology is relatively easy to use, improves productivity at work, and makes job performance easy. The responses were from staff who mainly agreed or were neutral with the responses and might be due to not being too familiar with the system. Regression analysis indicated that data analytics has an effect on tax compliance based on the significance value of 0.044 which was less than the 5 percent significance value.

5.2.3 Blockchain Technology

The study's third and final objective was to analyse how blockchain technology by Kenya revenue Authority affects tax compliance in Nairobi, Kenya. The findings indicated that blockchain technology is useful in improving tax compliance by taxpayers, improves performance, and also improves productivity. However, the finding indicated that it is not very ease of use by the staff who were neither agreed nor disagreed on blockchain being easy to use. This may be due to the fact that blockchain technology is a relatively new technology hence the staff will require more training. Regression analysis indicated that blockchain technology has no significant effect on tax compliance based on the significance value of 0.18 which was more than the 5 percent significance value.

5.3 Conclusions

The first objective of the study was to determine the effect of iTax system on tax compliance in Nairobi, Kenya. The findings of the study showed that iTax system has a positive effect on tax compliance based on the responses by K.R.A staff since it showed a positive effect on taxpayers' registration, filing of returns, and income declaration. In terms of its adoption, the iTax system is greatly accepted as they strongly agreed that it is deemed useful in enabling taxpayers file their returns online, it is easy to learn and use by both staff and taxpayers, and improves employees' performance at work. The regression analysis indicated a p-value less than 0.05 which indicated a significant effect. From these findings, the study concluded that iTax system has a positive effect on tax compliance in Nairobi, Kenya.

The second objective of the study was to analyse how use of data analytics by Kenya Revenue Authority affects tax compliance in Nairobi, Kenya. The study findings indicated that data analytics has an effect on taxpayers' registration, filing of returns by taxpayers,

and income declaration through identifying audit areas through taxpayers' economic patterns. The adoption of data analytics is not as receptive as iTax system since the mean responses were lower as compared to that of iTax. However, the adoption responses were still positive with respondents agreeing that data analytics is useful at their work, it is easy to learn and use, improves productivity, and makes performance easy. The regression analysis indicated a significant effect on tax compliance with a value less than 0.05. From the findings, the study concluded that data analytics has a positive effect on tax compliance in Nairobi, Kenya.

The third and final objective of the study was to analyse how blockchain technology adoption by Kenya Revenue Authority has an effect on tax compliance in Nairobi, Kenya. The study findings indicated that blockchain technology has an effect on taxpayers' registration, filing of returns, and income declaration as the technology seals tax evasion loopholes by taxpayers through stringent transaction trails. The adoption of blockchain is similar to that of data analytics as the respondents agreed blockchain technology being useful in improving tax compliance, is easy to use by staff, eases performance at work, and improves productivity at work. However, the regression analysis indicated a p-value greater than 0.05 implying that it was not statistically significant in affecting tax compliance. The findings led to the conclusion that blockchain has an effect on tax compliance but not statistically significant.

5.4 Recommendations

5.4.1 Managerial Recommendations

Based on the study conclusions, the study recommends that Kenya Revenue Authority should implement proper training of the new information technologies since many of the staff were not very conversant with the new technologies such as data analytics and

blockchain technologies. This would enable them to fully maximize them and hence improve tax compliance. The revenue authority should also come up with key performance indicators (KPIs) of the technologies implemented so that they can be adequately measured and monitored to determine their effectiveness. The study also recommends sensitization of taxpayers when a new information technology is being implemented. Finally, change management should be done well by K.R.A so as to minimize resistance that is common in many organizations when a new technology or system is being implemented. This includes proper communication and feedback of performance by staff.

5.4.2 Policy Recommendations

The study recommends that the government should come up with information technology policies that would regulate their usage, security, and privacy with regards to taxpayers' data by K.R.A. This will enable taxpayers be safe with their data when providing information during registration, tax filing, and tax payment.

5.4.3 Suggestion for Further Research

From the study findings, one of the suggestions for further research is to use other information technologies other than iTax system, data analytics, and blockchain technology to determine if the study findings would be the same. Another suggestion is for the study to use other analytical techniques such as correlation test which may be used to determine the relationship of information technology on tax compliance. Finally, researchers can look at other tax compliance aspects may be subject to study, other than tax registration, tax filing, and income declaration.

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QUESTIONNAIRE

The questions provided below form part of the research study which seeks to analyse the effect of information technology on tax compliance in Nairobi, Kenya. Your participation will be highly appreciated and the information provided will be confidential and purely for academic purpose.

PART I: GENERAL INFORMATION

	Response
Name (*optional*)	
Job position	
Number of years working at KRA	
Does KRA have adequate information technology to enforce tax compliance by taxpayers?	Yes ☐ No ☐

i) In your opinion, to what extent does technology in general have on tax compliance in Kenya?

No Extent ☐ Little Extent ☐ Moderate Extent ☐ Great Extent ☐ Very Great Extent ☐

ii) To what extent does iTax system have on tax compliance in Kenya?

No Extent ☐ Little Extent ☐ Moderate Extent ☐ Great Extent ☐ Very Great Extent ☐

iii) To what extent does big data analytics have on tax compliance in Kenya?

No Extent ☐ Little Extent ☐ Moderate Extent ☐ Great Extent ☐ Very Great Extent ☐

iv) To what extent does blockchain technology have on tax compliance in Kenya?

No Extent ☐ Little Extent ☐ Moderate Extent ☐ Great Extent ☐ Very Great Extent ☐

PART II: TAX COMPLIANCE

To what extent do you agree with the following statements, with **5 = Strongly agree, 4 = Agree, 3 = Neutral, 2 = Disagree, and 1 Strongly disagree**

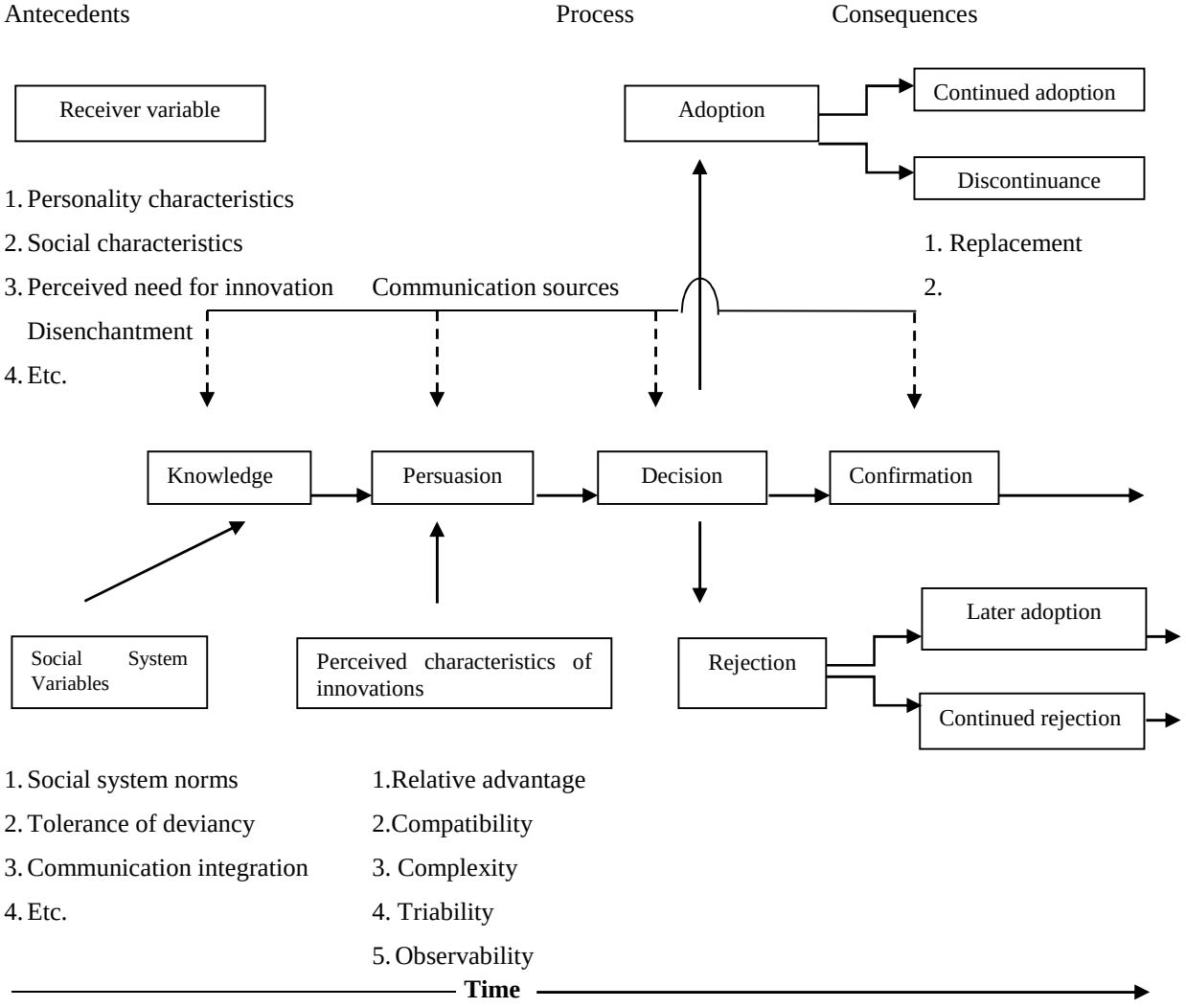
	5	**4**	**3**	**2**	**1**
i) Tax Compliance					
1) Taxpayers are declaring more taxes					
2) Taxpayers are filing their returns					
3) Taxpayers are declaring more income					
ii) Technology usage					
a) i-Tax	**5**	**4**	**3**	**2**	**1**
1) iTax is useful in enabling taxpayers file return online					
2) iTax is easy to use by KRA staff and taxpayers					
3) iTax system improves the performance at work					
4) Learning to use iTax system is easy					
5) I would recommend use of iTax system at work					
b) Data analytics	**5**	**4**	**3**	**2**	**1**
1) The use of data analytics is useful in my work					
2) Data analytics is easy to learn and use by staff					
3) Use of data analytics improves productivity at work					
4) Data analytics makes it easy to perform work					
5) I greatly recommend use of data analytics at work					

c) Blockchain Technology	**5**	**4**	**3**	**2**	**1**
1) Blockchain technology is useful to achieve the goals					
2) Blockchain technology is easy to use by staff					
3) Blockchain technology improves productivity at work					
4) Blockchain technology makes work performance easy					
5) I greatly recommend use of blockchain technology at work					

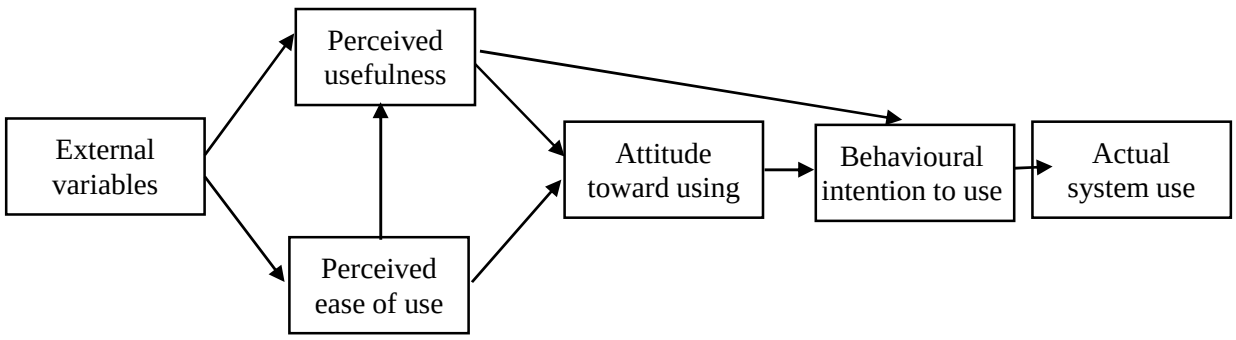
Thank you for your time

APPENDIX I: THEORETICAL MODELS

i) Theory of Diffusions of Innovation



ii) Technology Acceptance Model



iii) UTAUT Model