EFFECTS OF TAX REFORMS ON REVENUE, A STUDY OF KENYA REVENUE AUTHORITY

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DECLARATION

I, the undersigned, declare that this is my original work and has not been submitted for degree or any other examination in any other University.

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DEDICATION

I dedicate this work to my parents and family for their tireless effort, sacrifice, trust, encouragement and tremendous support in seeing me scale greater heights. Also to my Uncle and family for their unmeasured support in this endeavor. Lastly, to my colleagues and friends for their positive impact in my life throughout the entire study period at the University.

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ABSTRACT

The research focused on the effects of tax reforms on tax revenue in the 40 quartiles between the financial years 2012/13 and 2021/22. It took the form of a country case study and thus focused only on Kenya's tax collection agency, the Kenya Revenue Authority. Five chapters were used to present the research with chapter one focusing on the introduction, two on literature review, three on research methodology, four on data analysis, results and discussion, and five on summary conclusion and recommendations. The study variables included tax revenue for the dependent and tax reforms, exchange rate, GDP and inflation for the independent variables. Significant theories of tax reforms like the Optimal and Second best theories, and several empirical research outcomes were utilized in the study. Secondary data was sourced from reliable government entities like KRA, KNBS, CBK, the World Bank and so forth. The regression model alongside correlation was used in data analysis. The findings indicated that of the four predictor variables, the GDP had a more significant effect in determining changes in tax revenues. Tax reforms led to insignificant increases in tax revenue for the 40 quartiles studied. Increases in exchange rate, though positively correlated with tax revenue, had an inverse regression relationship with tax revenue hence an increase in Kshs. to the USD lowered tax revenue. The findings further indicated that increases in inflation decreased tax revenue. The research wrapped up by providing recommendations like the need to make continuous revision and moderation of tax reforms, limitations of the study like the focusing only on one agency (KRA), and suggestions for further studies like the need to incorporate tax elasticity and buoyancy measures in further likewise studies.

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LIST OF ACRONYMS AND ABBREVIATIONS

DST - Digital Service Tax

GDP - Gross Domestic Product

KRA - Kenya Revenue Authority

MOF - Ministry of Finance

NITA - National Industrial Training Authority

PAM - Proportional Adjustment Method

PAYE - Pay As You Earn

TMP - Tax Modernization Programme

UPR - Unified Payroll Return

V.A.T - Value Added Tax

VTDP - Voluntary Tax Disclosure Programme

OECD - Organization for Economic Co-operation and Development

SIG - Significant

INSIG - Insignificant

SBT - Second Best Theory of Taxation

OTT - Optimal Taxation Theory

TIT - Tax Incidence Theory

NHIF - National Hospital Insurance Fund

NSSF - National Social Security Fund

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Only few things are certain, unarguably, tax is one of them. The Organization for Economic Co-operation and Development (OECD) 2021 defines taxes as "compulsory unrequited payments to the general government or to a supranational authority". Indeed, taxes are involuntary payments made by taxpayers and the benefits they so receive from the government are never necessarily commensurate to the proportion of taxes paid. Cumulatively, taxes give rise to tax revenue which forms the dependent variable for this study. OECD 2021 defines tax revenue as revenue obtained from taxes on profits and income, taxes charged on goods and services, social security, payroll taxes, taxes on property ownership and transfer among others. Tax revenue is crucial for any government of the day for its running, provision of social welfare and funding of public expenditures to mention a few. Tax reforms lead to changes in the tax base, tax structure, and tax rates among others thereby influencing the overall amount of tax revenue collected. Kamasa et al. (2022) submit, from their research, that there was strong evidence indicating that tax reforms exerted positive and substantive impact on the generation of tax revenue in Ghana. Depending with the number, type, and extent of tax reforms, there might be an increase or a decrease in the tax revenue realized. Therefore, the relationship between tax reforms and tax revenue may be direct or inverse ceteris paribus.

To date, most developing countries still face problems of raising substantive tax revenue needed for promoting economic growth (Amirthalingam, 2020). The overall tax revenue as a percentage of the GDP provides a country's share of output collected by the government via taxes (Organisation for Economic Co-operation and Development, 2021). Zeqiraj and Nimani (2015)

argue that taxes form the main public revenue source which enables a state to meet its competency role of funding public expenditures. In 2012 for instance, individual income taxes formed the main tax revenue source and constituted 50.7% of Denmark's total tax revenue. Contrastingly, in the same year, consumption taxes formed the major source of tax revenue for the OECD countries with an average of 32% of their total tax revenues. United States relied mostly on individual income taxes which further constituted 37.7% of their total tax revenue as of 2012. Mexico and Chile relied mostly on taxes on goods and services which formed 54.5% and 50.1% respectively of their total tax revenue still as of 2012 (Pomerleau, 2015). Being one of the OECD countries, Kenya can be generalized to have heavily relied on consumption taxes like the social insurance taxes and the VAT in 2012 (Pomerleau, 2015). Kenya's tax to GDP ratio of 17.3% in 2019 was higher than that of 30 sampled African countries but highest in 2014 at 19.3%. Most share of Kenya's 2019 tax revenue was from taxes on goods and services other than VAT at 29% of the total tax revenue (Organization for Economic Co-operation and Development, 2021). The need for countries to both collect substantive tax revenues and do so in a sustainable way for the near and extended future, thus, forms the building block of this research. Substantive sustainable and continuous flow of tax revenue would ostensibly promote economic growth and minimize problems associated with fiscal imbalances.

The research is divided into five chapters, the introduction, literature review, research methodology, data analysis and interpretation, and summary of findings, conclusions and recommendations. The study is based on Kenya Revenue Authority, the sole agency in Kenya tasked with tax collection and administration among other duties. Tax revenue is dependent on various factors, however, this research singled out few such factors. The study based its

emphasis on the impacts of tax reforms on tax revenue. Therefore, the independent variables for this research constituted tax reforms alongside exchange volatility, GDP and inflation. Tax reforms lead to alterations of, for instance, tax rates, tax bases, and tax types and thus have direct and indirect impact on the amount of tax revenue that can be collected depending on the type of tax. Secondly, the exchange volatility has a direct impact on the value of currency and in Kenya's case, the Shilling. Taxes are usually collected in monetary forms signifying that tax revenue would increase or decrease in value depending on the strength or weakness of the currency: a matter that is determined by the current exchange rates. In his tax to GDP ratio study of Nepal, Dahal (2020) argues that there is a positive correlation between tax and the GDP. His finding was that the correlation coefficient of tax revenue and that of the GDP of Nepal was 0.98 and that tax revenue variation was 63.3% dependent on the GDP (Dahal, 2020). Furthermore, the tax revenue variation was 36.7% dependent on other factors and was high compared to the variation in the GDP. Therefore, the GDP can be understood as to be having significant effects on the tax revenue but with the appreciation of the fact that the effects from one country to another differs. Inflation effects on tax revenue were also investigated upon in the research. Tax revenue, like any other type of revenue is not immune from being misappropriated from the point it is issued by the tax payer to the point it is issued back as a benefit to the citizens in terms of public expenditure. Tax revenues are prone to variation depending on increases or decreases in inflation, the time lag between the period inflation occurs and when it is adjusted for among others (Immervoll, 1998). It is thus of worth to note that there can be a direct or indirect proportional relationship between inflation and tax revenue depending on the decrease and increase in inflation.

1.1.1 Tax Reforms

Ariyo (1997) in Gituku (2011) defines tax reform as the process of altering the manner of collecting or managing taxes by the government. By extension, tax reform involves a change in the status quo of tax collection and management of the various types of taxes (Gituku , 2011). Ayodele and Ebi (2017) also define tax reforms as "a process of changing the way taxes are collected or managed by the government". The duo further asserted that tax reforms are conducted to enhance revenue generation through improved tax yields. In both developing and developed countries, taxes constitute the main revenue source much needed by governments to finance their running costs, make public investments, fund social services among others (Ebi & Ayodele, 2017). In Kenya, reforms were initiated in the late 1980's under a program referred to as Tax Modernization Programme (TMP). The tax reforms objective was to create a tax system that was not only sustainable but also capable of generating enough revenues to fund public expenditures and address inequality issues. Some of the common problems that have had to be tackled by tax reforms include but are not limited to the need to increase tax yields, enhance the administration of taxes, and minimize tax-oriented economic distortions. As of 2005, Kenya had realized an increase in its tax revenues as a percentage of the GDP, replaced the sales tax with the VAT, addressed poverty concerns through exempting low-income earners from the income tax, and improved its commitment towards embracing tax reforms (Karingi & Wanjala, 2005).

Gituku (2011) argues that tax reforms are inevitable whenever the current tax system and structure has failed to achieve various canons of taxation. He further explains that a tax reform would generally be beneficial if it improves social welfare and increases revenue collection. Effective tax reforms are sensitive towards economic dynamics and current trends in domestic

and international domains. In addition to the aforementioned tax reforms listed by Karingi and Wanjala (2005), Eissa and Jack (2009) assert that there have been rationalization and simplification of rate schedules, introduction of new VAT, and the synchronization of Kenya's external tariffs with those of the East African neighbors. There have also been administrative and institutional reforms which saw, for instance, the creation of KRA in 1995 that has since then saw the centralization of tax administration. This paper focused on post onset of Covid 19 tax reforms within the FYs 2012/13 and 2021/22.

Akin to other tax collection authorities, KRA is a semi-autonomous institution from the government and thus operates under the supervision of a well-structured board of directors which is inclusive of diverse human resources (Eissa & Jack, 2009). Nonetheless, KRA does not work in isolation since it relies on funding from the Ministry of Finance (MOF). It also has to liaise with MOF and the government in the formulation of working tax policies. Ebi and Ayodele (2017) argue that the primary motive for Nigeria's tax reforms and revenue mobilization is the need to increase tax revenue and have a diversified tax system. They further argue that Nigeria's tax system had been highly dependent on oil revenue which, according to them, constituted an average of northwards of 70% of the country's total revenue between the years 1990 and 2014. Ironically, in spite of the major tax reform that saw the country divert away from oil revenue dependency, and tax restructuring, Nigeria is still grappling with an ever increasing fiscal deficit and a highly skewed revenue base which is bent towards oil revenue (Ebi & Ayodele, 2017). Likewise to Nigeria, Kenya has a fair share of the increasing fiscal deficit menace. Kenya's fiscal deficit rose from approximately 2% of GDP in the year 2003 to 8% in the year 2018 (Murunga et al., 2021).

The finance bill 2020 which was passed by parliament later that year, and also got assented to by the president, led to major changes in the country's tax system in the year 2021. To begin with, the finance act reinstated the 30% individual income tax from the previous 25% Covid-relief related rate. It also led to the elimination of the 15% to 20% tax band, and the raising of the lowest tax band to Kshs. 24,000 per month from the previous 12,298. Additionally, the act saw the lowering of the highest tax band to Kshs 32,333 from the previous 47,059 and the setting of the personal relief at Kshs. 2,400 (HLB International, 2021). The corporation tax was also reinstated to 30% from the previous 25% for the 2021/2022 and subsequent financial years. The previous reduced corporation tax of 25% was made applicable only for the income earned between 25th April 2020 and 31st December 2020, unarguably to provide cushion against the Covid-19 economic devastation in the country. Another key tax reform brought forth by the finance act was the introduction of the minimum tax: a base income tax at the rate of 1% of a company's turnover. By extension, the minimum tax was set to be paid by 20th of the fourth, sixth, ninth, and twelfth month of the relevant financial year's accounting period. Persons who engaged in retail businesses and whose prices were controlled by the government, like in the case of oil; and persons engaged in insurance businesses were however exempted from the minimum tax (HLB International, 2021).

The applicable VAT rate further got altered by way of reinstatement to 16% from the previous 14%. Furthermore, the tax act proposed that input-tax deductions should be made before applying the VAT especially for persons registered as manufactures. Other significant tax reforms and restructuring that took effect in the year 2021 included but were not limited to the

introduction of Digital Service Tax (DST); Voluntary Tax Disclosure Programme (VTDP); Disclosure of Company's Beneficiary ownership ; and the Implementation of the Unified Payroll Return (UPR) comprising NITA, PAYE, NHIF, and NSSF (HLB International, 2021).

1.1.2 Tax Revenue

Akitoby et al., (2020) assert that the mobilization of tax revenue is a central requirement by many countries in their economic policy making decisions. They further add that resources should be mobilized greatly domestically especially by the developing countries. Governments in developing countries need tax revenue to build a fiscal space for funding investments in the public sector, and provide public services (Akitoby, et al., 2020).Whereas a typical economy gets about 15% of their Gross Domestic Product (GDP) in tax revenue, a typical developed one gets about 40% of its GDP from tax revenue (Akitoby, Raising revenue, 2018). Tax revenue is much needed by the government of the day to provide essential services to its citizens, keep running, and partially offset its payables to mention a few. A sustainable and substantive revenue collection helps in dealing with future uncertainties. It also provides proper guidance on budget allocations come a given financial year. In the event that the revenue body fails to meet its tax target, it should at least collect an amount that nears the set target rather than one that is dangerously low. Nevertheless, in view of the ever dynamic economy coupled with bedeviling factors such as pandemics, only smartly framed tax reforms can help save the situation. Revenue in taxes is measured in terms of total monetary collection arising from the different set of taxes per a given financial year.

Despite there being little governments can do to alter the structural influencers of tax revenue in the short run, they can change other tax revenue influential factors such as corruption, quality of administering taxes, and the economic policies. By extension, it is a critical policy objective to mobilize tax revenue (Ghura, 1998).This research study planned to, among others, ascertain the characteristics of tax revenue collected by the Kenya Revenue Authority overtime especially in response to the different tax reforms introduced in Kenya overtime. Kenya, like any other country, needs the tax revenue and thus would engage in efforts to increase its revenue base while ensuring that critical sectors of the economy are protected. Langford & Ohlenburg (2016) agree with some of the previous authors quoted herein in asserting that the revenue raising activity will always be a target by many countries. They further add that the desire to generate additional revenue is regardless of the specific intended use of the collected revenue, which, among others, include for social services, public investment, and for reducing debt and deficit. Nonetheless, both institutional and economic conditions limit the tax revenue that can be realistically collected by a particular country (Langford & Ohlenburg, 2016). Indeed, tax revenue collection role has been prioritized globally based on the fact that most countries whether developed of developing are facing increasing fiscal deficits.

The fiscal deficits are as a result of limitation in budgetary resources, poor budgeting, over borrowing by the government, rocketing public expenditure, and weakness in revenue mobilization (Ouma, 2019). Successful tax revenue mobilization is therefore fundamental for enabling the government to meet its unending obligations. However, it should be done in a manner that is actionable if not acceptable by the tax payers since they are the ones who carry the burden.

With the onset of Covid-19 pandemic, substantial impacts on tax revenue were expected which further informed the conducting of this research article. By extension, the pandemic brought with it identifiable pointers including the loss of employment by most people both within and without the country, and the introduction of night curfews which tremendously reduced working and operational hours for people and businesses respectively. These, among others, are reasons enough to warrant the possibility of alteration of tax revenue which is a significant factor for the government and the country as a whole. Maganya (2020) argues that tax revenue from taxation is impactful in empowering developing countries to minimize poverty levels, and promote a sustained growth. Regardless of the state of the economy, tax revenue is an instrument much-needed by the government to meet its set expenditures, and accomplish its growth objectives in the long run. Furthermore, tax revenue encourages good governance through advocating for not only accountability but openness by the government to its citizen (Maganya, 2020).

1.1.3 Effects of Tax Reforms on Tax Revenue

Tax reforms involve the way a government changes its method of tax collection and management (Nwokoye & Rolle, 2015). Azubuike (2009) states that tax reform is a continuous process adopted continually by tax administrators and lawmakers in a country's tax system to provide for the changing social, political, and economical circumstances in its economy. A successful tax reform entails successful processes as opposed to merely complying with technical legislative alterations (Murray, Oliver, & Wyatt, 2014).

The post-onset of Covid-19 tax reforms included but were not limited to 100 percent tax cushioning for low-income earners, by extension, those who were earning a monthly gross income equal to or less than Kshs 24,000. Furthermore, the government provided an additional income of Kshs 1,700 for those earning less than or equal to Kshs 24,000. The PAYE band was also reduced to 25% from the initial 30%, and corporate tax reduced to 25% from 30% in the bid to cushion residents against the adverse effects of the covid-19 pandemic (Kpmg, 2020).

This study sought to explore the tax reforms introduced post the onset of Covid 19 pandemic. It then linked the annual tax reforms to the relevant quarterly KRA's revenues to ascertain the possible connections the two might have. This research regards the Covid-19 pandemic as a causal factor for most of the happenings and undertakings that came forth post its arrival. Nonetheless, the Covid-19 pandemic factor is considered an extraneous variable since its effects have been and are still being felt globally. Extraneous variables are irrelevant to the predictor variable and may not be included in the measurement as may the measurable variables (Piotrowski, 2021).

Following the realization that Covid-19 was finally in Kenya on the 12th of March 2020, the government acted promptly by coming up with mitigation measures. Besides tax reforms, other measures included the provision of strategic leadership, isolation and treatment of the Covid-19 victims, and contact tracing (Ministry of Health Kenya, 2020).

Organization for Economic Development (2010) argues that tax reforms should partly be informed by a tax bargain between the government and its citizens. Additionally, tax bargains

would induce mutual benefits, in that, the government will tend to collect more revenue with ease while the citizens get to enjoy high quality governance. Indeed tax reforms can occur in various ways but the end result is what mostly matters. Tax revenues may or may not increase in response to tax reforms under a given state of economy like in case of Covid-19 pandemic. Therefore, this research plans to unearth the truth on the ground: whether the tax reforms have a significant impact on the KRA revenues post the onset of Covid-19 pandemic. As of whether tax reforms lead to significant increase in tax revenues is still debatable and thus inconclusive. Despite a number of tax reforms being undertaken in Burundi since the 1980s, the ratio of total tax to that of the GDP hardly improved. Burundi, in addition, has been performing abysmally tax wise, with only 13.7% in terms of total tax to the GDP between 1982 and 2013 (Ndoricimpa, 2021).

Gituku (2011) suggests that Kenya is still not out of the woods in terms of using tax reforms to improve revenues. His words verbatim are "…Kenyan tax system was in general not productive despite several reforms and measures undertaken." Conversely, another study by Wanjala (2005) asserts that Kenya was able to achieve its desired tax yield of 22% by minimizing dependency on trade and direct taxes through various tax reforms. This research planned to shed more light on the effect of tax reforms on tax revenue and provide an informed opinion on whether the said tax reforms are substantially improving, failing to improve, or leaving the tax revenue in an indifferent state altogether. It aimed at preventing future confusion and uncertainties on the influential role of tax reforms on tax revenue. Since 1980, Kenya has been involved in a number of tax reforms chiefly to come up with a tax system that is sustainable, and which can generate

substantive revenues needed to fund public expenditure in addition to dealing with inequality issues (Wanjala, 2005).

1.1.4 Kenya Revenue Authority

The Kenya Revenue Authority was established following an act of Parliament specified under Chapter 469, and became functional on the premier of July the year 1995. Its role is to collect revenue for the Kenyan government. Broadly, KRA's core functions include but are not limited to assessing, collecting, and accounting for the total revenues whilst following stipulated rules; advising on tax administration and collection within the confines of the Kenyan laws; and performing other tax related functions as guided upon by the relevant ministry (Kenya Revenue Authoriy, 2021).

As the sole body tasked with collecting taxes in Kenya, KRA has inevitably been impacted upon by various tax reforms introduced overtime by the government of Kenya. KRA revenues may either increase or decrease depending on the effect a particular tax reform has on tax collection. Contrasting ideologies on the relevance of the tax reforms have emerged over time with some studies suggesting the possibility of little or zero impact on enhancing revenue collection. Moyi 2006 argues that despite Kenya introducing tax reforms in 1986 under what was termed 'tax modernization', there was no call for celebration since the challenges then before reforms are more or less the same with the ones post the tax reforms. Kenya's tax structure remains less buoyant and more likely inelastic.

1.2 Research Problem

Kenya grapples with limited tax revenue collection evidenced by an average of 7.8% of tax revenue to GDP ratio for the period 2006 through to 2020 (Ceicdata, 2021). To prevent the country from sinking deep into fiscal imbalances and unmanageable debt, a working panacea has to be sought and implemented in no time. Murunga, Wawire, and Muriithi (2021) argue that although Kenya has implemented various reforms in its tax system, it incessantly experiences a ballooning budget deficit. The trio asserts that diminishing tax revenue following the aftermath of the early 1970's oil shock left countries with two options: to either take tax reform as a necessity or to opt for the preferred tax alternative in dealing with the increased budget deficit. Most countries chose the former as opposed to the latter. Ahmed & Muhammad (2010), as quoted in Murunga, Wawire, & Muriithi (2021) explain that great increases in fiscal imbalance are caused by increases in the expenditures and reductions in the tax revenue collected.

Developing countries have small yet few sources of tax revenues, a reason which has contributed to the ballooning budget deficit (Murunga, Wawire, & Muriithi, 2021). Kenya's fiscal balance to the GDP ratio is averaged at -2.9% from 2009 to full year 2021 indicating that the country's total expenditures exceed its total revenues (Ceicdata, 2021). Taxation is the most vital source of government revenue and total tax revenues accounted for higher than 80% of entire government revenue in approximately half of all countries (Ospina & Roser, 2016). It was further higher than 50% in almost all countries.

To deal with the fiscal balance deficit menace, the government of Kenya must increase its total revenue capacity to match that of its total spending. On the flip side, it can lower its total

expenditure to be in tandem with its total revenue. Alternatively, it can choose to implement the two options which are increasing total revenue and drastically lowering total expenditure at one go. Nonetheless, this research purposed to delve in the instance whereby, in its bid to deal with the deficit in its fiscal balance, the Kenyan government chooses to increase its total revenue through solely increasing the tax revenue. Specifically, the research sought to answer the question of whether tax reforms were substantially impactful in changing the amount of tax revenue collected. It further sought to ascertain if the tax reforms impacts on the tax revenue were desirable or undesirable. Tax revenue is a critical necessity for enabling the continued running and survival of a government world over, and as aforementioned, forms the largest revenue source for virtually all governments. Tax revenue further contributes to the financing of human capital, provision of welfare services, and in promoting sustainable and equitable growth (Worldbank, 2021).

Prior studies on tax revenue impacts of tax reforms include that by Kieleko (2006) who found that tax reforms made overall positive effects on tax responsiveness in Kenya. Secondly, Kanyi and Kalui (2014) who asserted that tax reforms in Kenya were mainly undertaken to deal with inequality and create a tax system that is sustainable and which could generate enough revenue. The duo established, from their findings, that tax reforms led to a significant increase in the total tax revenue collected. However, in his tax study based on developing countries, Tanzi (1989) argues that tax reforms may be fruitless in making identifiable and useful impacts on tax revenue especially when the macroeconomic governing rules are rapidly and substantially changing. Ombati (2018), in yet another tax revenue effect of tax reforms study, established that tax reforms not only impacted significantly on tax revenue but that the impacts were positive.

1.3 Research objectives

1.3.1 General objective

To establish the impacts of tax reforms on tax revenue in Kenya

1.3.2 Specific objectives

i. To determine the impacts of tax reforms on tax revenue.
ii. To establish the effects of exchange rates on tax revenue.
iii. To determine the impacts of Gross Domestic Product on tax revenue.
iv. To establish the effects of inflation on tax revenue.

1.4 Value of the study

Disruptions to the economy are common and inevitable in most cases. Pandemics, wildfires, droughts and famine, and environmental degradation are some of the sudden disasters that hit nations globally. Tax reforms provide a better way of mitigating the adverse effects felt in the aftermath of disasters. The reforms may cushion citizens against extreme poverty, high costs of living, and loss of income generating avenues. In the case of Covid-19 pandemic, it was desirable and challenging to properly evaluate its impacts on the economy in the bid to mitigate uncertainty (Barbero, José, & Rodríguez, 2021).

Tax revenue is important in enabling the running of government, redistribution of resources, infrastructural development, improvement of the Gross Domestic Product (GDP) and so forth. OECD reports that as of 2019, income from taxes contributed 17.4% of the GDP. Taxes are important and thus should be collected optimally. By extension, a balance should be stroke in setting up tax levels that will seek to protect the interests of all stakeholders the likes of

investors, citizens, and the government especially against harsh economic periods. Tax reforms enable the revision of taxes to best suit the economy at whatever time of crisis. Nonetheless, earlier provision for uncertainties is better than later ones.

This study promises potential benefits not only to the revenue collecting body but also to citizens, the government, and investors both established and aspiring to do business in Kenya. It brings out the effects tax reforms have had over time-including post the onset of Covid-19 pandemic-on KRA's revenue; and the usefulness or otherwise of tax reforms in shaping Kenya's tax system.

The study will thus inform on decision making in taxes, shade light on the relevance of tax reforms, advice on better tax reform measures, and provide research-based analysis of the status of our country's tax system. It further adds on the contribution of other tax related researches in advising on how reliable tax reforms are in predicting a country's tax revenues.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter provides an overview of literature, theories, and studies related to tax reforms and taxation as viewed by various authors in their different past researches, and how they contribute to this study.

2.2 Theoretical Review

This study based its theoretical framework on optimal taxation theory, tax incidence theory, and the second best theory of taxation.

2.2.1 The Optimal Taxation Theory (OTT)

Stiglitz (2014) asserts that the optimal taxation theory can be traced back to a 1927 article titled "A contribution to the theory of taxation" by Ramsey. In the article, Ramsey (1927) sought to determine how tax rates ought to be altered to keep the utility decrement at a minimum. Ramsey alluded that a specific revenue has to emerge from proportionate taxes on partial or full uses of income, and that each use would have a distinct rate of taxation (Ramsey, 1927). Stiglitz (2014) argue that the standard OTT posits that the choice of a tax system should be based on one that maximizes the social welfare aspect subject to a number of limitations. He adds that the OTT views social planners as utilitarian in that the individuals' utilities form the basis of the social welfare. While interpreting Ramsey's article, Stiglitz (2014) asserts that for the social planner to generate a given amount of tax revenue solely from commodities, the tax should be imposed in an inversely proportional manner to the select taxpayer's elasticity-of-demand for the good.

Fleurbaey and Maniquet (2014) reiterate that OTT is a study that explores how tax systems can be designed to broaden social welfare. According to the two, the main ingredients of the OTT are goods, labor and consumption, and agents. One weakness of the OTT was that it assumed homogeneity in many aspects, for instance, consumers' preferences: which differs in reality. Nonetheless, relative weights may be assigned to distinct people with distinct incomes, and in so doing, mitigate the weakness of OTT brought about by heterogeneity. OTT is informative in the determination of how tax reforms can be optimized to maximize social welfare, guarantee reliable tax revenue streams and so forth.

2.2.2 The Tax Incidence Theory (TIT)

Mieszkowski (1969) argues that a number of interrelated impacts are associated with tax policies. Taxes, he adds, affect savings, investment patterns, incentives, and some disrupt resource allocation. Of importance though, is his argument that the structure and level of taxes dictate both the amount of disposable income and the post-tax income distribution among distinct groups. Tax Incidence analysis, thus, is the "investigation of the distributive effects of taxes" (Mieszkowski, 1969). TIT focuses on how commodity prices and factor returns are affected by distinct tax regimes. The proportional income tax's burden from all income is imposed proportionately to a taxpayer's share of the national income. However, the case is different with other taxes and commodities hence one weakness of the TIT. TIT has been modernized overtime to include the aspect of equilibrium in the bid to capture other types of taxes. The Modern General Equilibrium Incidence Theory (MGEIT) relies on the marginal productivity distribution system which assumes that firms select factor proportion to reduce costs of operation and set prices of commodities at maximum profit.

The TIT assumptions upheld by the modern theory include a perfectly competitive factor markets and commodity; absence of foreign trade; perfect mobility of factors of production among different industries; and all supplies of the factors stay in a perfectly-inelastic-supply to the whole economy (Mieszkowski, 1969). McLure (1971) asserts that in coming up with the tax incidence theory article, Mieszkowski utilized a general equilibrium-model borrowed from the works of Harberger in the latter's "Theory of international trade" article. TIT studies generally assume that a specific tax incidence might be examined regardless of making reference to the use of funds it exacted (Kendrick, 1930).

The TIT is crucial in scrutinizing the distribution of revenue which further goes in line with the study's objective of finding the effects of tax reforms on tax revenue post onset of Covid-19. Through the TIT, tax revenue distribution can be traced and best practices made by the use of its general equilibrium model thus shaping tax reforms.

2.2.3 The Second Best Theory (SBT)

Guesneri and Oddou (1979) argue that the SBT of taxation is normally a subject of normative analysis. They add that SBT lays emphasis on "best" solutions that can still be derived under troubling conditions depicted by presence of various constraints: which derail the achievement of the initial best Pareto-optimal conditions. SBT's focal concern, therefore, is on how to characterize the "second best" solutions (Guesneri & Oddou, 1979). Bennear and Stavins (2007) assert that SBT can be exemplified in a situation where there exists a constraint within general equilibrium systems which makes it difficult to attain one optimal Pareto condition. The

achievement of other optimal Pareto conditions becomes undesirable with the failure of one due to constraints. Taxation of capital income has proven to be problematic based on different conditions. By extension, if corporate income is taxed at the rate of 30% like in Kenya, optimal taxation argues that the same rate should apply to other capital incomes. It however becomes challenging to tax property owners living in their own apartments at the same rate.

In some countries like the USA initially the tax rate on home owners was zero but has been revised overtime. In 2020 the applicable tax rate on home owners' was 1.1 percent of the average value of one's home in USA (Stebbins & Sauter, 2020). To deal with the differential issues arising from optimal taxation, Auerbach, as cited by Feldstein (1985), proposes that the government is at liberty to assign optimal tax rates for each of the different kinds of capital incomes. The attainment of Paretian optimum dictates that all the optimum circumstances be simultaneously fulfilled. SBT emphasizes that in the event that there is a constraint in the general equilibrium state and one condition fails to be accomplished, it becomes unnecessary to attain the other requirements (Lipsey, 1957). According to Lipsey (1957), the SBT offers the chance for achieving another optimum condition but by departing from all of the remaining Paretian conditions: if one cannot be fully attained.

2.3 Determinants of KRA's Tax Revenue Post Onset of Covid 19

2.3.1 Tax types and Tax bases in Kenya

According to Simiyu (2001) as cited in Kieleko (2006), classification of taxes is based on their rates and outcomes, bases, and the administrative methods of collection. Kieleko (2006) asserts that in regard to rates and outcomes, taxes can further be classified into proportional,

progressive, and regressive. On the one hand, Proportional taxes are ones in which the tax liability increases proportionally with an increase in a taxpayers income. On the other hand, Progressive taxes are ones in which the increase in tax liability of a taxpayer increases with the increase in his/her income though with a greater margin that surpasses proportional increases.

Regressive taxes are ones in which a tax payer's tax liability relates inversely to his/her increase in income. In other words, Regressive taxes are those depicted by a reduction in taxes despite an increase in the taxpayer's income (Kieleko, 2006). The object of taxation must be legally described thus giving rise to the tax base. The tax base for imports, for instance, is determined by the quantity and quality of imports in part or as a whole depending on the number of liable taxpayers. As for the administrative methods of tax collection, taxes can either be directly collected or indirectly collected. In direct taxes, the payer pays directly to the revenue body (KRA) while in indirect taxes, it is impossible to trace in prior the specific tax payer of a particular tax. Income tax is one charged on yearly basis on all a resident or non-resident person's income which was obtained in Kenya. The income tax is one of the many types of taxes outlined in the KRA's website. It is obtained from a person's rental income, business income, employment income to mention a few. Income tax can be segregated based on the mode of collection which in turn brings about PAYE, Corporation Tax, Advance tax, Withholding tax, and Installment tax.

The rental income is a tax charged on the income obtained by renting out a property or properties, and is dependent on whether the property rented was used for commercial or residential purposes. There is also the VAT, a tax charged on the ferrying of goods and services

that are taxable and made or offered in Kenya, and on the importation of such like goods. The Excise tax, also imposed by KRA, is one charged on manufactured goods in Kenya or imports in terms of goods which have been specified in Excise Duty Act 2015's first schedule. The Capital Gains tax, on the one hand, is one charged on the entire gain derived by a seller or company upon transferring the ownership of his/their Kenyan-based property to another person within Kenya. On the other hand, the Agency Revenue is one which KRA collects on behalf of other income collecting agencies and can be in two forms: stamp duty and betting tax. While stamp duty tax is taxed on transfer of securities, shares, and properties, betting tax is one charged on the gross revenue derived from gaming activities.

2.3.2 Tax Reforms in Kenya Pre and Post onset of Covid-19

Murunga et al. (2021) argue that any attempt to change the present status quo of a tax system amounts to tax reform. The 1970's oil shock led to dwindling tax income which saw most developing nations embark on massive tax reforms (Murunga, Wawire, & Muriithi, 2021). In Kenya, though, massive tax reforms were embarked on in the year 1986 after the publication of Sessional Paper Number 1 of 1986 (Muriithi & Moyi, 2003). Wagacha (1999) as cited in Muriithi and Moyi (2003) argues that the tax reform program ought to seek three key things: improvement of the productivity and efficiency of taxes; gaining of effectiveness in taxes via a greater elasticity of taxes; and improving tax administration and collection whilst reducing tax rates.

Income tax is one of the direct taxes and is taxed on an income of an individual, company, rental property owners among others. In 1988 the applicable income tax for individuals decreased from

65 percent to 32.5 percent while that of companies from 45 percent to 30 percent. Additionally, a shift from the classical form of taxation and the unification of structures led to the minimization of chances of double taxation (Kieleko, 2006). Kieleko (2006) also adds that with the introduction of a unique KRA pin for an individual, KRA has been able to capture most taxpayers and enhanced the minimization of tax evasion in the country. The latest (2022's) income tax for individuals is 10% on the first Kshs 24000 per month, 25% on the next Kshs 8,333 per month, and 30% on entire income exceeding Kshs 32,333 per month, and an individual is entitled to a tax relief of Kshs 2400 per month (KRA, 2022).

Withholding tax varies between 5% to the lowest and 30 % to the highest and is dependent mainly on a person's income and whether he/she is a resident or a non-resident. The Corporation tax for resident companies stand at 30% but 37.5% for non-resident companies. The VAT tax, an indirect tax, is currently levied at the rate of 0% for zero-rated products, to 8% for petroleum oil derived from bituminous, and motor spirits, and through to 16% for other services and goods. The current import duty ranges between 0% and 25% for normal goods but may be higher than 25% for special goods (KRA, 2022).

The excise duty is charged according to the excise duty act and applies on, inter alia, excisable goods that are manufactured in Kenya by a manufacturer who is licensed. In other words, excise duty is a tax charged on manufactured or otherwise processed goods. Excise duty charges are in two fold, charges in Kenya Shillings per a given quantity of goods or scope of services and rates per a given volume. According to the first schedule of the Excise duty act (2015), the seemingly lowest charge is Kshs 5 per a litre of water and non-alcoholic beverages with the exclusion of

vegetables and fruits. On the other hand, the seemingly lowest rate is 10% for food-supplements, and certain beauty products and cosmetics.

The direct effects of rates can be predicted in that an increase in tax rates leads to an increase in the amount of tax collected ceteris paribus. Conversely, a reduction in tax rates has an immediate effect of reducing the tax collected by the revenue body ceteris paribus. In the long term, however, other factors such as reduction of tax bases, increase in tax evasion and avoidance, failure of citizens to declare their authentic income when remitting taxes to mention a few may render the tax collectable lower despite increases in tax rates and vice versa on the opposite

2.3.3 Inflation levels in Kenya

Simiyu et al. (2020) define inflation as "sustained increase in general prices of goods and services in an economy" over some time. With the rise of the prices of goods and services, one unit of currency purchases less hence a direct indication of the decline of people's purchasing power. Simiyu et al. further ague that presumably, an increase in the excise duty tax rate caused by the government, increases the prices of goods. Therefore, inflation triggers an increase in taxes since the higher the prices of goods the more the tax payable against them.

The position that an increase in inflation increases tax revenue is however debatable since it may not explicitly apply in all scenarios. In contrast, from a simple perspective, the decrease in a person's purchasing power would deter him/her from mass purchasing goods and services and in so doing decrease the extent a government can tax his consumption habit. Upon finishing their study, Simiyu et al. (2020) concluded that in Kenya an increase in inflation by one unit would

cause a decrease in the performance of tax revenue. Based on Simiyu et al. (2020) study, inflation has an inverse relationship with tax revenue performance.

2.3.4 Tax evasion and Tax avoidance

Although the two have a similar impact on tax revenue in that they cause it to decrease, they are totally different. Tax evasion entails illegal means of eluding one's tax obligations while tax avoidance entails legal ways of minimizing one's payable tax. Macharia (2014) argues that in trying to evade tax, some individuals wrongfully register entities by concealing their intended use, for instance, registering organizations as not-for profit so as to report less or zero profit hence pay less or no tax. Another instance is that of the informal sector whose players usually insist on collecting cash in lieu of issuing cash sales. In that regard, they end up depositing the cash payments in their individual bank accounts and underreporting their sales hence paying less tax (Macharia, 2014).

KRA estimates that there have been Kshs 65 billion worth of fake invoices issued in Kenya from 2015 with the worst year being 2016 which saw the generation of Kshs 32 billion worth of fake invoices (KRA, 2022). Tax avoidance, on the other hand, include cases such as using money to make and expand investments with the view that investments would attract less taxes. Returns from government securities are tax exempt hence one can invest with the government to benefit from tax exemption (CBK, 2022).

2.3.5 Exchange Rate Volatility

Hau (2002), Obstfield and Rogoff (1988), and Calderon (2004) as cited in Ofori et al. (2018) agree that tax revenue can be adversely impacted by fluctuations in the exchange rate of a country especially due to riskier trades associated with increased volatility of the country's exchange rates. Although it is difficult for a local currency to maintain its value overtime, it would be undesirable for it to have a great loss in its value.

Trade players contribute in the payment of taxes and a variation in their profits directly impacts on the potential tax revenue. In the case of adjustment costs and uncertainty due to exchange rate volatility, trade players are directly affected by having either their profits lowered or encountering losses. With the persistent of exchange rate volatility, the level of openness and liberalization of open economies dwindles and that directly impacts upon the ability of a country to generate revenue (Ofori et al. 2018).

2.3.6 Corruption

Nawaz (2010), of Transparency International, asserts that researchers agree widely that corruption impacts negatively on tax revenue and its impact is significant. By extension, an increase in corruption results into a decrease in the ratio of tax revenue to that of the GDP. Secondly, in the long run, corruption decreases the base for tax revenue by hindering economic growth. Thirdly, corruption distorts the morality of taxpayers thus causing people to oppose taxation and eventually end up paying less tax (Nawaz, 2010). Indeed, corruption has an inverse relationship with tax revenue and, unless reduced, can hinder the growth of any given nation.

2.4 Review of Empirical Studies

Stoilova (2017) conducted a study on tax structure and economic growth targeting the European Union member states. His assertion was that the designing of an optimum tax system was dependent on a number of factors and differed from one country to another. The main objective of the study was to provide suggestions for a growth conductive system of taxation. 28 European Union (EU) member states were covered in the study between the period 1996 and 2013. The study employed both descriptive and empirical analysis to understand cross-country differences on design of tax structures and the economic growth impacts of taxation respectively. Study findings were that, firstly, the European countries had a challenge structuring their budget while simultaneously improving their economic growth. Secondly, that it would be appropriate for the countries to redesign their tax structures by increasing consumption taxes and lowering capital and labor taxes for an increased economic growth. Other findings were that spending by the government was non-contributory to an increase in GDP; tax revenues in totality were less harmful to growth; and balanced budgets provided a friendly growth atmosphere (Stoilova, 2017). In this study, the need to redesign tax systems was emphasized and that affirmed the relevance of tax reforms on improving a country's tax structure.

A study by Barrios et al. (2020) on the progressive reforms in taxation majorly in flat tax countries focused on countries in Central and Eastern Europe. Their objective in the study was to establish the impacts of shifting from a flat tax to a progressive form of taxation system with regard to personal income tax. Additionally, they applied macro-models and micro-simulation methods of data analysis. According to the study, there were shifts by some Eastern European countries from complex tax systems: with the progressive tax being cited as being among

complex taxes, to simpler schedule of taxes characterized by low statutory marginal tax rates and fewer tax brackets. Two waves of tax shifts were experienced with one being in the 1990s and the other in the 2000s. The Baltic countries (Latvia, Lithuania, and Estonia) adopted moderately high tax rates in the first wave while countries such as Hungary and Romania, in Russia's followership, adopted tax rates that were nearer to the minimum pre-shift tax rates. The study results were that embracing the progressive system of personal income tax, and enhancing its elements under plausible and alternative tax reform scenarios would cause positive significant effects on equity and redistribution. By extension, it would also increase the tax revenue yields. The macroeconomic effects of budget neutral reforms, as also suggested by the study findings, appeared positive even though minimum for all countries. The choice of whether to adopt a flat or progressive system of personal income taxation lies on the intended scope of implementation.

Zeng et al. (2013) conducted a study on the impact of tax reform and economic growth on tax structure and revenue. The study which was undertaken between 1950 and 2011 focused on China which, according to the study, had undergone seven adjustments within the aforementioned period of study. For the analysis, the study utilized three methods which included principal component, multi segment linear regression, and descriptive statistics. Furthermore, the study focused on three tax aspects including the V.A.T, corporate tax, and total tax. It asserted that institutional and economic factors were the chief fundamental factors affecting both the structure and amount of taxes. The study findings were that reforms in taxes had a significant change effect on the relationship between tax revenue and GDP, and the growth in economy was impactful on the tax structure and the total tax revenue in in short-term.

Although tax reforms impacts on tax revenue were present, the study did not explicitly depict whether they were positive or negative, it instead remained indifferent.

In their comparative study of tax policy in developing countries, Bahl and Bird (2008) review changing aspects of tax policies in developing countries 30 years down the line. They firstly juxtapose Argentina with Canada and Australia over the last century using secondary data, and in so doing, end up arguing that Argentina failed to achieve economic growth due to its poor tax choices compared to its peers. Interestingly, the study echoes a position by Kaldor (1963) in (Bahl & Bird, 2008) that for a country to be deemed developed: it must collect from tax revenue at least 25% to 30% of its GDP. Contrastingly, most developing countries are far from achieving that state. The study, which was conducted in 2008, focused on three groups of countries namely developing, Industrialized, and transitional, and used comparison to gauge the effectiveness of tax policy reforms. Their findings indicated that, within the 30 years, transitional countries' tax revenue as a percentage of GDP decreased from 47.7% to 29.1% while that of developing countries first increased by slightly more than one percent for the first decade from 16.2% then stabilized to a flat of 17%. As for the industrialized countries, the tax revenue as a percentage of GDP increased by 5% from 30% over the same period. Their findings, furthermore, suggested a lack of desirable relationship between levels of taxation and either growth rates or level of incomes. Also, that it is necessary for countries to keep their tax levels and that of expenditure close.

Gnagnon (2019), in his study on the trade openness implications of tax reforms in developing countries, had the objective of determining the relationship between the two variables. The study

applied empirical analysis and covered 92 developing countries' from secondary data obtained between 1980 and 2014. Although the researcher did not fully disclose the identity of the 92 developing countries, it is clear that the study was conducted in Geneva Switzerland. Bray Curtis dissimilarity index was used to make comparison between the tax structure of developing countries and that of developed countries. Of importance to note however, is that the study used tax revenue changes to gauge the extent of trade openness. By extension, it asserted that a tax reform would impact on trade openness based on its impact on revenue. Study results indicated a positive relationship between tax reform and trade openness, an indication that tax reforms led to positive impacts on tax revenue generation. Moreover Less Developed Countries (LDC) enjoyed more positive trade openness benefits of tax reforms compared to ones that were relatively advanced. Governments in developing countries ought to seek transition tax reforms with the help of international institutions the like of World Bank and IMF (Gnangnon, 2019). Therefore, tax reforms should be approached with care in light of their positive impact on public revenue and thus trade openness.

Muriithi and Moyi (2003) argue that one of the chief objectives of the tax reforms undertaken in Kenya was to reduce the incessant fiscal imbalances. They used the concept of buoyancy and elasticity, borrowed from Mansfied (1972) as cited in (Muriithi & Moyi, 2003), to analyze Kenya's tax structure productivity in light of the tax reforms introduced between 1973 and 1999. The duo assert that a tax system's response to alterations in national income stems from two causal factors: buoyancy pertaining to the relevant tax structure or its in-built flexibility otherwise termed as elasticity. Upon using secondary data from Kenya's statistical abstracts and economic surveys, the two came up with various findings. By extension, that the reforms in taxes

positively impacted on the tax structure and the individual tax-handles. Direct taxes, additionally, were more affected by the reforms compared to the indirect taxes. The VAT tax was found to be rigid by a greater extent than any other type of tax.

In spite of introducing numerous tax reforms, argue Murunga et al. (2021), Kenya perpetually experiences deficits in its budgets. The trio's objective was to probe Kenya's tax system's responsiveness to discretionary measures and the GDP during the period commencing 1970 and terminating 2018. The choices available for Kenya to salvage itself from budget deficits, they add, are either increasing its tax revenue or borrowing. Interestingly, they hint on their disfavor for borrowing by asserting that if done domestically, will lead to the crowding out of investment. On the other hand, if borrowing is done externally, also as asserted by the trio, it will lead to either non-concessional loans which-attracts undesirable conditions-or loans with high interest rates. Murunga et al. (2021), likewise to Muriithi and Moyi (2003), used the concept of elasticity and buoyancy, though borrowed from Prest (1985) as cited in (Murunga et al. 2021), for their analysis of the tax system's responsiveness. Their results showed that a tax buoyancy coefficient of 1.28 of the tax system for the period (1970-2018) was higher than that of its tax elasticity which had a coefficient of 0.91. Additionally, the reforms in taxation implemented by Kenya led to an improvement in the tax revenue collection between 1970 and 2018. Indeed, their results were in concurrence with those of Muriithi and Moyi (2003).

Kieleko (2006), likewise to Muriithi and Moyi (2003), and Murunga et al. (2021) asserts that Kenya experienced tax revenue mobilization problems, and fiscal imbalances. She adds that the chief concern of Kenya's tax reforms was to solve the two bedeviling issues. Nonetheless,

Kieleko (2006) had the objective of evaluating the productivity of tax revenue in Kenya between 1973 and 2003. Similar to other aforementioned researchers, she applied the concept of elasticity and buoyancy, but also the Proportional Adjustment Method (PAM) for her analysis of tax reforms effects on tax revenue. Her findings were that the reforms greatly impacted on elasticity than they did on buoyancy, a contrast of the findings by Murunga et al. (2021). Kieleko (2006) attributes the increase in revenue during the period to "automatic changes rather than discretionary policy". However, she agrees with Muriithi and Moyi (2003) that tax reforms impacted greatly on direct taxes than on indirect taxes. She winds up by deducing from her findings that, in overall, the tax reforms impacted positively on tax responsiveness.

In evaluating the tax revenues and tax policy reforms in Kenya, Kariba (2011) focuses on the period from 2001 to 2010. She argues that the revenue authorities were still facing the same challenges at the time of conducting her study (2011) as they were years down the line. The tax reforms, in her view, seemed to have done less or nothing to improve the tax authorities' (KRA's and Ministry of Finance's) fortunes. Kariba (2011) further cites concerns that Kenya is one of the most unfriendly tax states in the world, and remains uncompetitive on matters taxation. The study used survey methods and applied descriptive research design alongside paired t-test for its data collection and analysis respectively. It utilized secondary data: like the studies by Murunga et al. (2021); Muriithi and Moyi (2003); Gnagnon (2019); and Kieleko (2006) from KRA tax collection statistics. The finding by Kariba (2011) was that a significant improvement existed in the collection of tax revenues post the introduction of tax reforms in Kenya. In expounding, we cannot agree more to the fact that Kariba (2011) had debunked her own prior assertion-that reforms led to a state of indifference in tax revenue improvement-in light of her contrasting study

results. Nevertheless, her findings echoed the findings of other aforementioned researchers like Kieleko (2006).

In consideration of the increasing government expenditure and shrinking donor funding, there is need for more measures to be adopted to influence the tax system to yield more revenues (Wanjiku, 1993). The objective of the study by Wanjiku (1993) was to establish the implications of tax reforms on tax revenue productivity in Kenya. The study was alike to those by Muriithi and Moyi (2003); Kieleko (2006); and Murunga et al. (2021) since it applied the concepts of elasticity and buoyancy for its analysis. Secondary data from Kenya's Ministry of Finance, economic surveys, and budget speeches was utilized while the study period was between 1972/3 and 1990/1 financial years. The study finding was that there was generally a lower tax-to-base elasticity value in comparison with the tax system's base-to-income value for the period. With the exemption of PAYE, all other taxes were found to have inelastic tax-to-base ratios in regard to their elasticity. The buoyancy of the tax system was also found to be greater than its elasticity. Additionally, the discretionary measures were deemed necessary in raising tax yields (Wanjiku, 1993).

2.5 Conceptual Framework

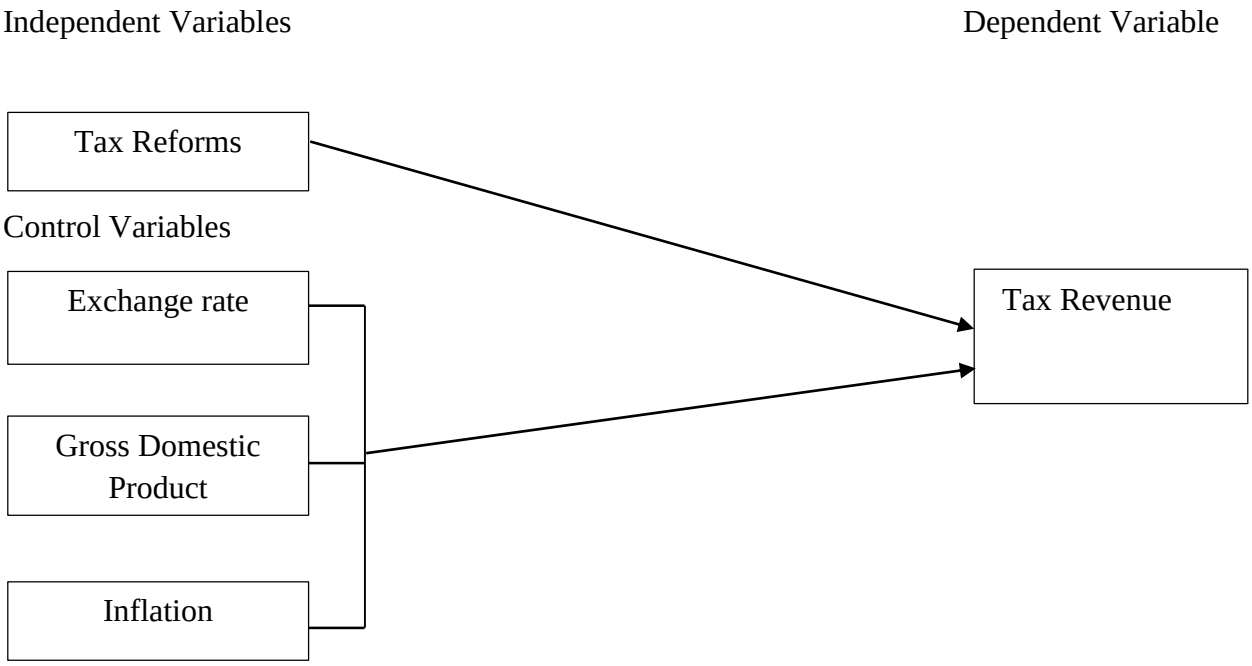

Figure 2.1: Conceptual framework

Source: Author, 2022

2.6 Summary of Literature Review and Research Gaps

From the literature review, one thing is clear, that there is need for consistent tax reforms to deal with a number of budgetary and tax revenue issues. Stoilova (2016) suggests the designing of an optimal taxation system for a growth conductive taxation model. Barrios et al. (2020), on the other hand, assert that the adoption of a progressive form of taxation would not only lead to high tax revenue yields but additionally promote equity and redistribution.

Albeit not hinting on whether tax reforms had a positive or negative outcome, Zeng et al. (2013) acknowledges that, indeed, tax reforms had a significant impact on tax revenue-to-GDP relationship. Interestingly, Bahl and Bird (2008) study is almost perfectly related to that by Zeng

et al. (2013) in focusing on the relationship between tax revenue and GDP. However, Bahl and Bird (2008) concentrate on tax reforms in developing, transitional, and industrialized states. The duo's finding is that there is an undesirable relationship between taxation levels and growth rates. Additionally, that government should reduce the gap between the levels of tax revenue and expenditure.

The fifth study by Gnagnon (2019) focuses on how tax reforms would alter trade openness in developing countries. Of essence to note in the study by Gnagnon (2019) is that he uses the increase or decrease in tax revenue: that results from the undertaken tax reforms as an indicator of trade openness. By extension, Gnagnon (2019) views increases in tax revenue as an indicator of great trade openness and decreases as the reverse effect. Tax reforms are also viewed as means of dealing with incessant fiscal imbalances, perpetual budget deficits, and tax revenue mobilization problems (Muriithi & Moyi, 2003; Murunga et al. 2021; Kieleko, 2006). The three additional studies by Murithi and Moyi (2003), Murunga et al. (2021), and Kieleko (2006) used the concept of elasticity and buoyancy to analyze tax reforms effects. The findings from the trio studies were in concurrence with the context that tax reforms had a positive effect on the tax revenue and tax structure.

The study by Kariba (2011) focused on the need of tax reforms to reduce Kenya's tax unfriendliness and increase its tax competitiveness. Her results show that tax reforms lead to significant improvements in the collection of tax revenues. The last empirical study by Wanjiku (1993) focused on the tax revenue impacts of tax reforms. In particular, Wanjiku (1993)

researches on the need for the government, through tax reforms, to deal with shrinking donor funding and increases in its expenditure by increasing its tax revenue.

Inflation, corruption, and exchange rates were also found to impact negatively on tax revenue. Research gaps included the need to determine whether Kenya's tax system was uncompetitive and unfriendly as compared to other tax systems. Additionally, to find out how a country can balance its expenditures and income with the view of narrowing negative fiscal balances. Budget optimization methods was also considered a key area in dealing with revenue collection.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides the methods used in the design of the study alongside the population, data collection procedure, type of data, the validity and reliability of data, and ultimately the analytical model.

3.2 Research Design

Sekaran and Bougie (2016) opine that a research design is a plan for not only the collection of data but also measuring and analyzing it (data) to answer the research questions. For this research study, a case study research design was applied to fully focus on the one agency that was under study.

Case studies, according to Sekaran and Bougie (2016), emphasize on obtaining information about a specific activity, object, or event such as in the case of an organization unit. By virtue of the fact that this study only focuses on KRA, and specifically the way its revenues have been impacted upon or otherwise by tax reforms overtime to present, it suitably fitted to be identified as one that utilizes a country case study research design.

The study used the regression model and correlation to substantially explore its objectives. Correlational studies brings out the relationship between variables, however, the presence of a relationship between variables does not necessarily suggest that one variable causes a change in the other (Sekaran & Bougie, 2016). Descriptive statistics were applied to enhance the understandability of the study variables.

3.3 Population

The research focused on the tax revenue effects of tax reforms post onset of Covid-19. It wholly utilized on secondary data from various sources. With revenue being the key aspect of consideration, Kenya Revenue Authority was primarily selected as the only government approved tax collection agency for Kenya.

Tax revenue figures provided a broad picture of the effectiveness of the tax reforms introduced in Kenya overtime. The revenue figures were observed for a period of 10 years commencing the financial year 2012/2013 and ending 2021/2022. This period was considered long enough by the study to portray the various impacts of tax reforms on tax revenue.

3.5 Data Collection

Secondary data for this research was collected from verified government and other organizations databanks online. Specifically, tax revenue data was derived from the Central bank of Kenya's Government finance statistics portal (Central Bank of Kenya, 2022). For tax reforms, a dummy variable of 1 and 0 was used with 1 representing years post onset of Covid 19 and 0 pre-onset. Exchange rates of Kenya Shillings against 1 USD were sourced from Ceicdata and Central Bank of Kenya's websites and the values were found to be in tandem (Ceicdata, 2022; Central Bank of Kenya, 2022).

Quarterly GDP values were obtained from the Central Bank of Kenya's National accounts statistics website (Central Bank of Kenya, 2022). As for inflation, data was obtained by using the

monthly Consumer Price Indices sourced from Kenya National Bureau of statistics' 2015, 2020, 2021, and 2022 National Economic surveys to calculate monthly inflation rates (Kenya National Bureau of Statistics, 2022). The monthly totals inflation rates were then compared for conformity with the annual rates presented by the Central Bank of Kenya, World Bank and World data websites (Central Bank of Kenya, 2022; World Bank, 2022; Worldata, 2022). The compared annual inflation rates were found to be in conformity thus valid for data analysis.

3.6 Validity and Reliability

Validity determines how well a process, instrument, or technique measures a given concept while reliability shows the consistency and stableness of the instrument on tapping the variables (Sekaran & Bougie, 2016). The validity of secondary data collected is usually dependent on the particular secondary sources chosen by the researcher. For this research study, the data was collected from published government and world sources accessible from various official websites including but not limited to the CBK, Kenya National Bureau of Statistics, and the World Bank.

Based on the rigorous research done by governments and other world research bodies, the data generated were mostly valid and trustable. Furthermore, such data rarely changed once published, for instance, GDP growth rates, inflation rates, and exchange rates. It is in this regard that prior related researchers like Kieleko (2006) and Wanjiku (1993) have referred to such data for their researches. The data was also subjected to validity tests like tests for normality and their significance and coefficients determined.

3.7 Data Analysis

For the gathered data, correlation, regression, and descriptive statistics were conducted using SPSS and the Microsoft Excel software. The data was shown in tables and diagrams for proper comprehension of its behavior. The p value of 0.05 was used for interpreting the level of significance of data gathered. Coefficient of data, on the other hand, was also interpreted. Generally, the interpretation was shown in tables derived from the aforementioned software.

3.7.1 Analytical Model

The analytical model used in the study for all four objectives was as follows:-

$TR\ (\%) = \beta_0 + \beta_1 RF + \beta_2 EX + \beta_3 GP + \beta_4 IF + \varepsilon$...I

Where

TR (%) = Revenue from tax as a % of summed total (76865542.62 M) for the study period.

β_0 = Constant

RF = Tax Reform (Dummy value)

EX = Exchange volatility

GP = Gross Domestic Product

IF = Inflation index, and

ε = Error term

TR represented the tax revenue collected from CBK website from financial year 2012/13 to financial year 2021/22 and was measured in values of Kenyan Shillings

RF represented the post onset of Covid 19 tax reforms introduced from 1st Quarter of the calendar year 2020. The reforms were of major taxes (income tax, corporate tax, sales tax, VAT and excise tax), and were measured using a dummy value of 1 for the quartiles post onset of Covid 19 and 0 for quartiles pre onset of Covid 19.

EX represented Exchange volatility and by extension the variation of Kenya shillings against the dollar. The volatility figures were derived from Ceicdata and CBK dataset online and were measured in quartile figures of Kenya shillings to 1 US dollar ($) between financial years 2012/13 and 2021/22.

GP represented the seasonal adjusted Gross Domestic Product values sourced from CBK. The GDP which provides the country's overall economic performance was measured in values of million Kenya Shillings for the period 2012/13 to 2021/22 while;

IF represented inflation and was measured in summation of 3 months rates per a given quartile period 2012/13 to 2021/22. The inflation figures were obtained through calculation of monthly Consumer Price Indices sourced from KNBS as illustrated in the appendices section.

3.7.2 Diagnostic Tests

Diagnostic tests were conducted based on reference on past studies. It emerged that indeed tax reforms were potentially impactful on altering tax revenue as in the case of, for instance, a study by Moyi 2006 on "Taxation and tax modernization in Kenya".

Other diagnostic tests conducted on the data included normality assumption, multicollinearity and autocorrelation. Multicollinearity occurs commonly in time series based data since most of the data usually follow a given trend (Ng'ong'o, 2021).

3.8 Test of Significance

This research adopted a 95% level of confidence in testing the worthiness of data. As such used the 5% level of significance such that variables with a p value equal to or less than 0.05 were regarded significant while those contrary (p value>0.05 p) were regarded insignificant (Oliech, 2013). The data was further subjected to relevance tests including but not limited to beta tests, coefficient and t value tests.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter details the processes, techniques, and models used in data execution. It specifically presents data validity, descriptive statistics, and trend, correlation and regression analyses. Finally, it provides a summary of the regression model results and a discussion of the research findings.

4.2 Data Validity

Data validity tests the worthiness of data in presenting the outcome of the research.

4.2.1 Data Execution

For proper data analysis, Tax revenue (in Millions of Kenya shillings) were converted from their absolute form to percentages. Total summation was treated as 100% while a specific quartile's value a percentage portion of the total tax revenue. Data was analyzed in 40 quartiles commencing FY 2012/2013 and ending FY 2021/2022.

4.2.2 Normality Test Results

The data was subjected to a normality testing using Excel software. Skewness was done to determine the data's asymmetry measure of probable random variable distribution about the mean. Kurtosis, on the other hand, was done to determine the data's height and sharpness.

Skewnesss and Kurtosis Results

Excel Function	Tax Revenue	Tax reforms	Exchange rate	GDP	Inflation
=skew(range)	0.552	1.200	-0.384	0.124	0.726
Test Interpretation	Moderately skewed	High Right skewed	Moderately skewed	Approximately skewed	Moderately skewed
=kurt(range)	-0.487	-0.592	-0.783	-1.125	1.764
Test Interpretation	Moderately kurtik	Moderately kurtik	Moderately kurtik	Platykurtik distribution	Leptokurtik distribution

Table 4.1: Skewness and Kurtosis

From the test interpretation in table 4.1 above, data on Tax revenue, Exchange rate and Inflation was moderately skewed thus not so much to the left nor right. With a skewness of 1.2, Tax reforms data was highly skewed to the right. GDP's data was approximately skewed at an almost zero skew of 0.124.

Apart from GDP and Inflation which had platykurtik and leptokurtic distributions respectively, the other variables (Tax revenue, Tax reforms, and Exchange rate) were moderately kurtik i.e. had a moderate height and sharpness. Data was approximately normally distributed. As such there was neither extreme bending of the data on the right nor the left. Normality plots were attached in the appendices section.

In multicollinearity testing a Variance Inflation Factor (VIF) equals to 1 denotes lack or correlation, between 1 and 5 moderate correlation, and greater than 5 high correlation. On table 4.2 above, GDP is highly correlated with tax revenue with a VIF of 7.332 followed by Exchange

rate with 5.883, and moderately by tax reforms with 2.188. However, with a VIF of 1.091, Inflation was almost not correlated at all with tax Revenue.

4.2.3 Multicollinierity Test Results

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Tax_Reforms	.457	2.188
	Exchange_Rate_Ksh	.170	5.883
	GDP_M_Ksh	.136	7.332
	Inflation	.917	1.091

Table 4.2: Multicollinierity test output

4.2.4 Autocorrelation Test Results on tax revenue

Autocorrelation Test Result for Tax Revenue Percentage

Series: Tax_Revenue_Percentage

Lag	Autocorrelation	Std. Error[a]	Box-Ljung Statistic		
			Value	df	Sig.[b]
1	.073	.152	.231	1	.631
2	-.259	.150	3.186	2	.203
3	-.035	.148	3.240	3	.356
4	.822	.146	34.793	4	.000
5	-.002	.144	34.793	5	.000
6	-.289	.142	38.915	6	.000
7	-.072	.140	39.177	7	.000
8	.713	.138	65.832	8	.000
9	-.012	.136	65.840	9	.000
10	-.271	.134	69.951	10	.000
11	-.093	.131	70.454	11	.000
12	.586	.129	91.029	12	.000
13	-.049	.127	91.179	13	.000
14	-.274	.124	96.028	14	.000
15	-.124	.122	97.058	15	.000
16	.454	.120	111.474	16	.000

a. The underlying process assumed is independence (white noise).

b. Based on the asymptotic chi-square approximation.

Table 4.3: Autocorrelation results

In autocorrelation, values between -1 and zero denotes negativity in autocorrelation whereas those between 0 and 1 positive autocorrelation. Column 2 of table 4.3 above showed that tax revenue values were mostly negatively auto-correlated. It was the same case for the other variables.

4.3 Descriptive Statistics

Descriptive statistics provide an overall description of data as is without any interference. As depicted in table 4.5 above, all data spread across 40 quartiles was available for all the variables under study. The mean, median, mode, standard deviation, variance, range, minimum, maximum, total sum and percentiles were given consideration.

For the quartiles between 2012/13 and 2021/22, the mean tax revenue was 1921638.56 Million while the total summed revenue 76865542.62 Million. The median (central) tax revenue stood at 1770452.49 Million while the most common (mode) at 281025.33 Million. The minimum and maximum quartile tax revenue values were 281025.33 Million and 4927479.32 Million respectively. Deviation from mean of the tax revenue was at standard deviation of 1203216.91 million. The difference between the highest and lowest tax revenue was 4646453.99.Million while the variance (spread from average) 1447730933372.4. The high variance showed a high spread hence cumulative increases in taxes overtime within the period of study (2012/13-2021/22).

A value of 0 and 1 was used to signify pre-onset and post onset of Covid 19 tax reforms respectively. This study only focused on post onset which began in the first quartile of 2020/21 Financial year. The sum of post onset quartiles was 10.

The mean of Exchange rate for the 40 quartiles in the period 2012/13 to 2021/22 was Kshs. 99.65 to 1 USD while the most common rate was 101.91 as depicted on table 4.5 below. The maximum exchange rate of 116.34 signals degrease in valuation of Kenya shillings against the USD when compared to all quartiles mean. Therefore, the lower the exchange rate, the higher the value of Kenya shillings and vice versa.

As for the GDP, the 40 quartiles' sum total was 77915809 Million. GDP was highest at 2417238 Million and lowest at 2417238 Million. Further, Kenya's GDP had a mean, median and mode of 1947895.22 Million, 1942636.5 Million and 1565450.00 Million respectively. A higher difference between the highest quartile GDP (2417238 Million) and all quartile mean (1947895.22 Million) of 469342.78 Million showed that the GDP is on a growth trajectory within the Financial period of 2012/13 and 2021/22.

Quartile Inflation was highest at 10.79 % and lowest at 3.53 % between FYs 2012/13 and 2021/22. The mean and median of inflation were almost equal at 6.05% and 6.06% respectively while mode slightly lower at 5.99%. With a variance of 2.05 and standard deviation of 1.43, it is of worth to note that the change in inflation had been minimal. Minimal changes in inflation evidenced by the low standard deviation of 1.43 showed that there had been less fluctuations in

the levels of inflation. A stable inflation rate especially to the lowest is good for a country since it maintains the value of the local currency against unnecessary devaluations.

		Tax_Revenue_M_Ksh	Tax_Reforms	Exchange_Rate_Ksh	GDP_M_Ksh	Inflation
N	Valid	40	40	40	40	40
	Missing	0	0	0	0	0
Mean		1921638.5655	.2500	99.6523	1947895.2250	6.0580
Median		1770452.4900	.0000	101.8550	1942636.5000	6.0650
Mode		281025.33[a]	.00	101.91	1565450.00[a]	5.99[a]
Std. Deviation		1203216.91036	.43853	8.82711	244013.66132	1.43252
Variance		1447730933372.401	.192	77.918	59542666912.794	2.052
Range		4646453.99	1.00	32.06	851788.00	7.26
Minimum		281025.33	.00	84.28	1565450.00	3.53
Maximum		4927479.32	1.00	116.34	2417238.00	10.79
Sum		76865542.62	10.00	3986.09	77915809.00	242.32
Percentiles	25	782375.4525	.0000	90.2900	1739184.5000	5.0500
	50	1770452.4900	.0000	101.8550	1942636.5000	6.0650
	75	2720364.6000	.7500	103.4950	2144679.5000	7.0000

Table 4.4: Descriptive statistics

4.4 Trend Analysis

Crucial it is, to determine the behavior of independent variables over time using trend analysis. It provides forecasts on various dimensions of the data, for instance, whether it has been increasing, decreasing or rather at a constant within the period of study. Buvaneswari and Lakshmi (2015) argue that with trend analysis, one can not only forecast but also budget. The duo further add that trend analysis can be used to determine alterations in operating and financial data over a given period of time.

For this research, trend analysis was conducted on all variables but tax reform. Tax reform's values were represented by a dummy (1 and 0) thus known in prior. Quarterly revenue, as depicted in Figure 4.3 below, experienced an upward trend between the lowest quartile (Qtrl. 1 2012/13) and the uppermost quartile (Qrtl. 4 2021/22). The "M" shape of the trend on the same Figure indicates that quartile tax revenue had been alternating from very low to very high repeatedly and surprisingly over the entire period. Nonetheless and to Kenya's benefit, the last two quartiles (Qrtl. 3 and Qtrl. 4 of 2021/22) have experienced a steady increase in tax revenue. The last quartile's tax revenue in FY 2021/22 was 4927479.32 Million.

Quarterly Tax Revenue (Million Kshs.)

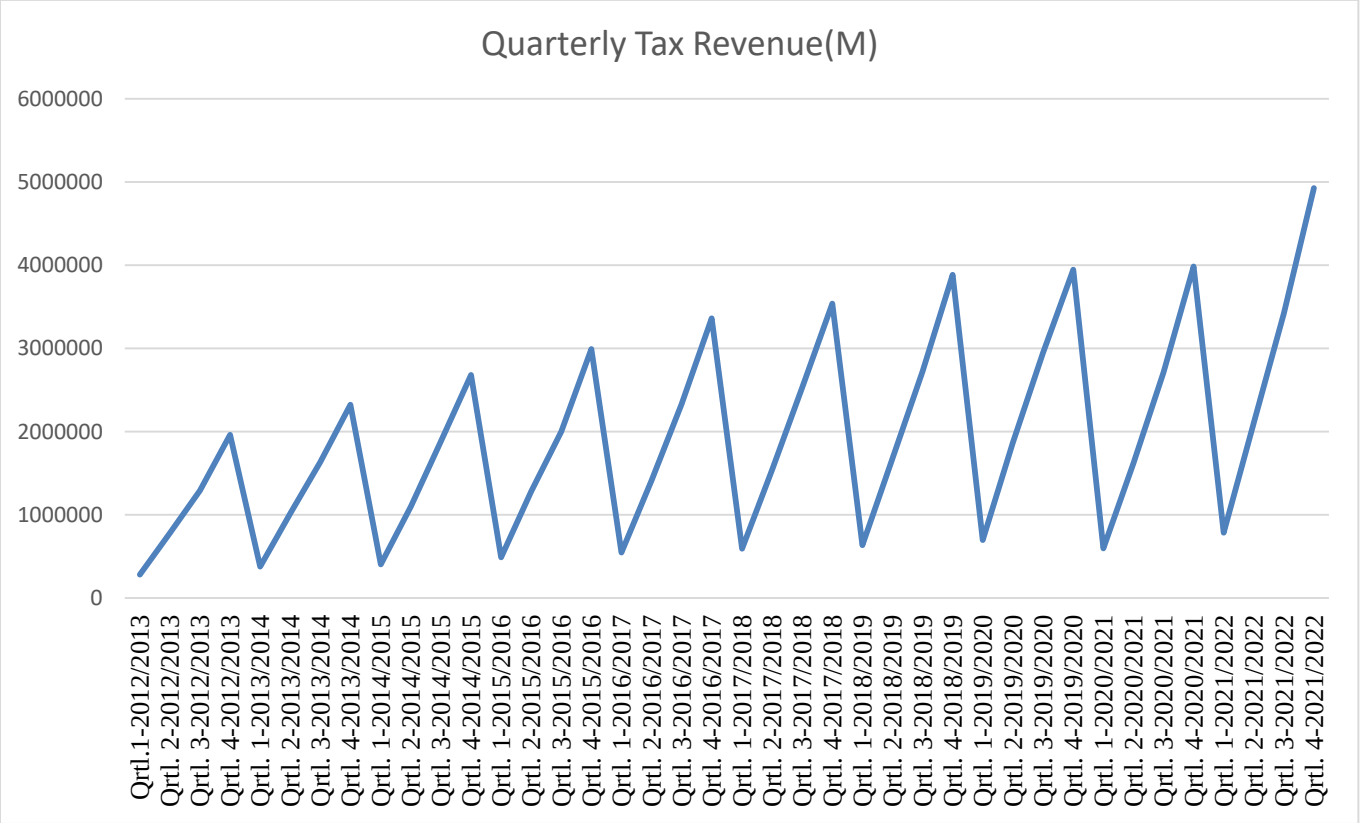

Figure 4.3: Trend on tax revenue

Trend Analysis on Quarterly Exchange Rate (Kshs. To 1 USD)

As shown in Figure 4.4 below, quarterly exchange rate- from the first quartile- experienced an almost constant value of slightly higher than Kshs 80 to the USD until quartile 2 2014/15 from which it shot upwards to slightly more than Kshs. 100 to the USD at quartile 1 2015/16. The rate (Kshs. 100 to 1 USD) stood to approximately constant between quartile 1 2015/16 and quartile 3 2019/20. Afterwards, it experienced an upward trajectory throughout to the last quartile (Qrtl. 4 2021/22) but for quartile 4 2020/21 where it slightly declined.

The last quartile rate (Qrtl. 2021/22) of Ksh116.34 to USD is worrying since it is higher than the earlier Kshs 80 to 1 USD and KS 100 to 1 USD. The higher the exchange rate, the lower the local currency's purchasing power especially on importations. It further signals dissipation of Kenyan shillings' value against the dollar since more of it (Kshs.) fetches few USD.

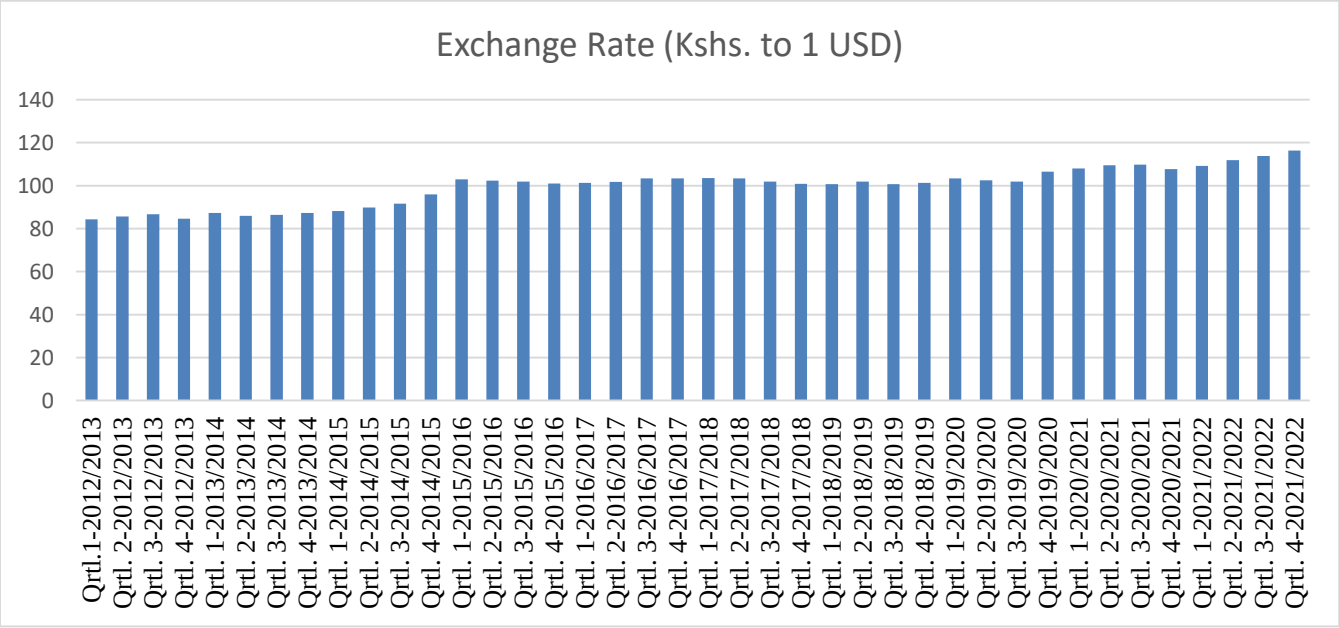

Figure 4.4: Trend analysis Exchange rate

Quarterly GDP

Kenya's GDP, as shown in Figure 4.5 below, had been increasing overtime between FY 2012/2013 and FY 2021/22. But for quartiles 2 and 3 of FY 2020/2021, the GDP growth rate had been on an increasing end. Low GDP values in quartiles 2 and 3 of 2020/21 can be attributed to, among others, the Covid-19 pandemic which led to an economic downturn, limited international trades due to travel restrictions imposed during the period, and low purchasing power to due loss of jobs. The lowest GDP, coincidentally in the first quartile (Qrtl. 1 2012/13), was Kshs. 1565450 Million. Interestingly, the highest GDP was in the last quartile (Qrtl. 4 2020/21) at Ksh. 2417238 Million. High GDP indicates improvement in the economic conditions of a country, high all revenue yields including tax revenue, profitable trading ventures among others.

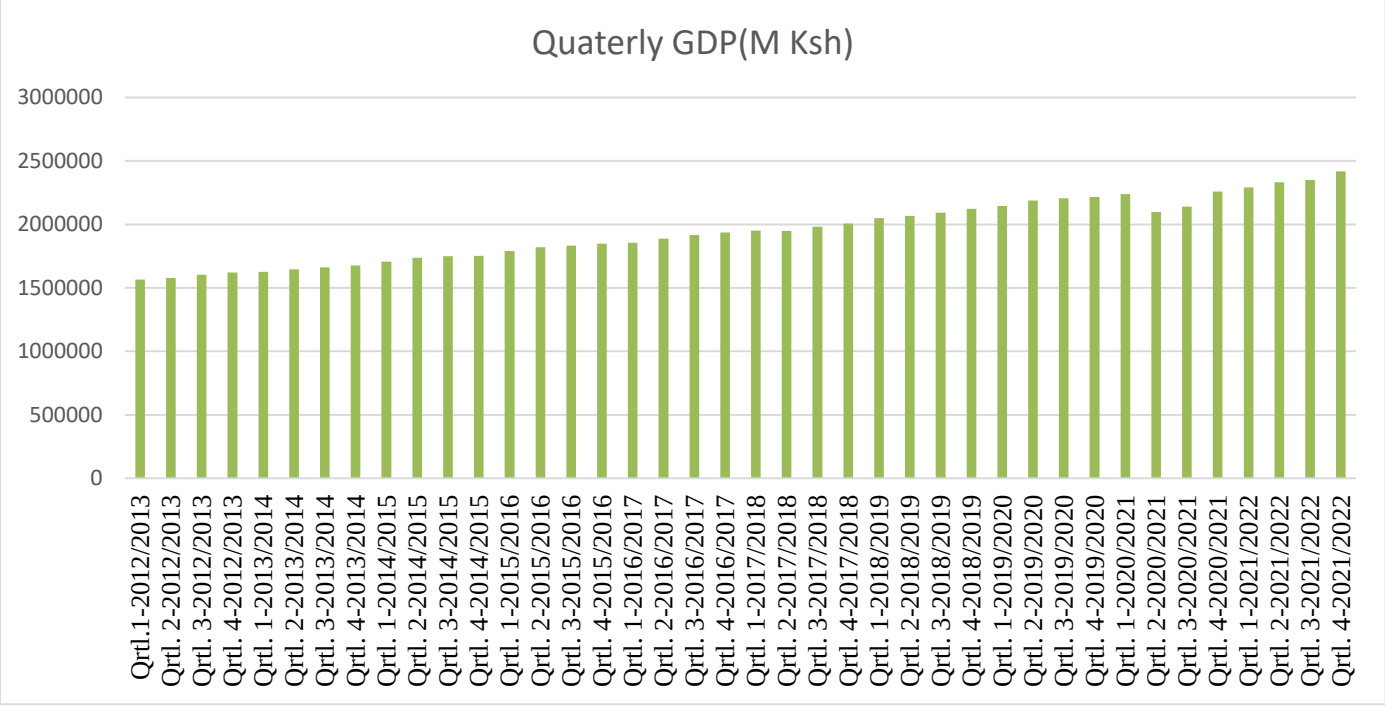

Figure 4.5: Trend analysis on GDP

Quarterly Inflation

The trend on inflation, unlike other variables, was distinctively unique. As depicted in Figure 4.6 below, inflation rates, from the first quartile (Qrtl. 1 2012/13) have been fluctuating from first rate of 6.4% to lowest rate of 3.5% in the second quartile (Qrtl. 2 2012/13). The rates then increased firstly steadily then in an unpredictable manner of slight highs and lows until quartile 4 of 2016/17 where the rate was highest at 10.8%. Afterwards, the trend decreased steadily to a low value of 3.9 % (truncated) in quartile 4 2017/18 followed by slight increases and decreases to the very last quarter's (Qrtl. 4 2021/22) value of 7.15.

Given that the annual inflation rate of the calendar year 2021 stood at 6.11, the last quartile's value of 7.15 proves an increase of 1.04%. A high inflation rate is a recipe for more detriments than otherwise. It leads to general increases in the prices of goods and services, reduces the local currency's (Kshs) purchasing power and devalues the local currency against foreign currencies.

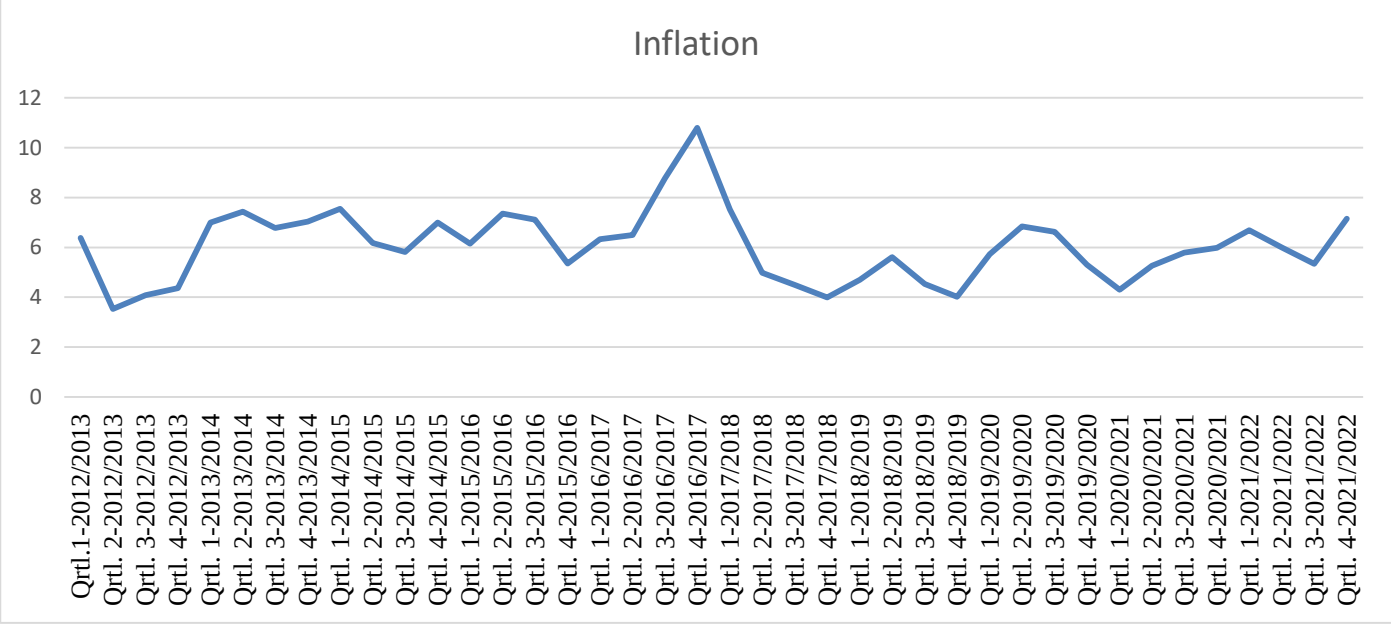

Figure 4.6: Trend analysis on inflation

4.5 Correlation Analysis

Correlation analysis measures the degree of association between and among variables. A change equal to 1 showed perfect positive correlation while a change equal to -1 perfect negative correlation. Pearson correlation is commonly used for data that is joint and with a normal distribution (Schober, Boer, & Schwarte, 2018). The below table 4.5 provides a summary of Pearson 2 tailed test and was used in interpreting the relationship between variables. For this research, independent variables (tax reforms, exchange rate, GDP, and Inflation were correlated against the dependent variable (tax revenue). In that regard, only results in column 3 (in grey) downwards were considered. Other columns were included for full display of Pearson's results.

Correlations

		Tax_ Revenue	Tax_ Reforms	Exchange_ Rate_Ksh	GDP_ M_Ksh	Inflation
1) Tax_Revenue (%)	Pearson Correlation	1	.380*	.445**	.501**	-.014
	Sig. (2-tailed)		.016	.004	.001	.930
	N	40	40	40	40	40
2) Tax_Reforms	Pearson Correlation	.380*	1	.649**	.736**	-.087
	Sig. (2-tailed)	.016		.000	.000	.592
	N	40	40	40	40	40
3) Exchange Rate	Pearson Correlation	.445**	.649**	1	.903**	.035
	Sig. (2-tailed)	.004	.000		.000	.831
	N	40	40	40	40	40
4) GDP_M_Ksh	Pearson Correlation	.501**	.736**	.903**	1	-.091
	Sig. (2-tailed)	.001	.000	.000		.576
	N	40	40	40	40	40
5) Inflation	Pearson Correlation	-.014	-.087	.035	-.091	1
	Sig. (2-tailed)	.930	.592	.831	.576	
	N	40	40	40	40	40

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.5: Pearson 2 tailed correlation

4.5.1 Tax reforms impacts on revenue collection

From the correlation results in expanded row 2 and column 3 of table 4.5 above, tax reforms variable was positively though minimally correlated with tax revenue at 0.380. The result was significant since the p value of 0.016 of the 2 tailed Pearson test was less than the 0.05 level of significance. Therefore, tax reforms lead to 0.380 increase in tax revenue and the higher the improvement of tax reforms the higher the slight increase in tax revenue and vice versa.

4.5.2 Exchange rate effects of tax revenue

Exchange rate was moderately correlated with tax reforms at a correlation of 0.445 depicted in expanded row 3 and column 3 of table 4.5 above. The results were significant at Pearson's 0.01 level of significance since the p value was 0.004 hence less than the Pearson value. A moderate correlation showed that one unit change in Exchange rate positively impacts by half on one unit of tax revenue ceteris paribus.

4.5.3 GDP impacts on tax revenue

Correlation results in expanded row 4 column 3 of table 4.5 above showed that GDP was moderately correlated with tax revenue at a correlation of 0.501. The results were significant as the p value was 0.01 which was equal to Pearson's 2 tailed 0.01 level of significance. By extension, the p value was still lower than Pearson's 0.05 level of significance. Therefore, an increase in one unit of GDP led to an increase by half the unit of tax revenue ceteris paribus.

4.5.4 Inflation impacts of tax revenue

As depicted by the results on expanded row 5 column 3 of table 4.5 above, tax revenue was negatively correlated with inflation at -0.14. A negative correlation showed an inverse relationship between the two variables. An increase in 1 unit of inflation for the 40 quartiles within the study period led to a decrease in one unit of tax revenue by -0.14. Unlike other variables whose results were significant, the correlation results for inflation were not significant. By extension, the p value was 0.930 which was higher than Pearson's minimum of 0.05. Nonetheless, since the inflation figures were sourced on as was basis, they were relevant for the study. Inflation impacts negatively on tax revenue and the higher the inflation rates the lower the tax revenue.

4.6 Regression Analysis Results

Regression analysis, as regards this research, was essential in providing the relationship between a dependent variable and one or more independent variables. It paints a picture of whether alterations in the dependent variable can be attributed to one or more of the explanatory (independent) variables. Tests on significance, R and R square, VIF, ANOVA, coefficients, and residual were conducted on the data. To depict the true picture of relationship between variables different regression tests were done since the constant (tax revenue value when all other variables are at zero) was not a true positive. As such, data was analyzed firstly using regression with constant then without constant (regression through origin) via "Enter" and "Stepwise" methods of regression. Regression without constant made more meaning to the R value and increased the regression scope by reducing the residual level. On the other hand, "Enter" method of regression analyzed all variables regardless of their statistical significance while "Stepwise"

method excluded variables that were statistically insignificant while showing results of those that were significant in the model.

4.6.1 Summary of Regression Model Results

Regression model summary summarizes on the R square which is the degree of change in the independent variable attributed to all the dependent variables. A model is significant if its p value is less than the 0.05 level of significance.

As illustrated in table 4.6 below on regression with constant, the model was significant since its p value of 0.33 was less than 0.05 level of significance. The R square of 0.253 showed that only 25% of change in the dependent variable was attributed to all the independent variables. This was possible since the regression lacked a true positive constant hence the effect of a negative constant was high on the independent variables. The explanatory variables had a 0.503 effect on the dependent variable as illustrated by the R coefficient. This showed that the independent variables (tax reforms, exchange rate, GDP and Inflation effected by half the dependent variable (tax revenue). The standard error of 1.43 was significantly lower.

Regression with constant

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.503[a]	.253	.167	1.42827	.253	2.959	4	35	.033

a. Predictors: (Constant), Inflation, Exchange_Rate_Ksh, Tax_Reforms, GDP_M_Ksh

b. Dependent Variable: Tax_Revenue_Percentage

Table 4.6: Regression with constant

To correct the negative constant effect on the regression model, a regression through origin was run to provide more picture and meaning on the relationship between variables. The following below results on table 4.7 were thus derived. The model significance improved to 0.00 from 0.33 which was best lower than the significance level of 0.05.

The R, amount of change in the dependent variable attributed to all the independent variables increased from 0.503 in table 4.6 above to 0.887in table 4.7 below. The percentage of change on dependent variable caused by the independent variables also increased from 25% (0.253) in table 4.6 above to 78.7% in table 4.7 below. Regression from origin therefore provided a better picture of the degree of variation between variables since it was devoid of the negative constant.

Based on regression through origin, it can be deduced that a unit change in the independent variables (tax reforms, exchange rate, GDP and inflation) led to a 0.787 change in 0.887 unit of tax revenue.

Regression through Origin i.e. without constant

Model Summary[c,d]

Model	R	R Square[b]	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.887[a]	.787	.763	1.42942	.787	33.261	4	36	.000

a. Predictors: Inflation, Tax_Reforms, GDP_M_Ksh, Exchange_Rate_Ksh
c. Dependent Variable: Tax_Revenue_Percentage
d. Linear Regression through the Origin

Table 4.7: Regression through origin

4.6.2 Analysis of Variance (ANOVA)

ANOVA (regression with constant)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.148	4	6.037	2.959	.033[b]
	Residual	71.399	35	2.040		
	Total	95.547	39			

a. Dependent Variable: Tax_Revenue_Percentage

b. Predictors: (Constant), Inflation, Exchange_Rate_Ksh, Tax_Reforms, GDP_M_Ksh

Table 4.8: ANOVA (with constant)

The ANOVA results on table 4.8 above, on regression with constant, showed that the test was significant with a p value of 0.33 which was less than 0.05. The F value stood at 2.96 which was not that high. The sum of residual squares of 71.40 was however more than the sum of regression squares of 24.15. The target of any regression analysis is to reduce residual thus have more of the dependent variable subjected to changes in independent factors.

To correct the high residual level, a regression through origin was conducted. The results, as shown in table 4.9 below indicates the aftermath of the removal of the negative constant effect in the model. The model was significant at 0.00 which was lower than 0.05 acceptable level of significance. The value also increased to 33.26 indicating more stableness of the ANOVA model. Additionally, the degree of variation in regression increased relative to the residual. Since the residual was lower, the regression from origin proved dependable in depicting the true picture of how the variables related.

ANOVA (Regression through origin)

ANOVA[a,b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	271.840	4	67.960	33.261	.000[c]
	Residual	73.557	36	2.043		
	Total	345.397[d]	40			

a. Dependent Variable: Tax_Revenue_Percentage

c. Predictors: Inflation, Tax_Reforms, GDP_M_Ksh, Exchange_Rate_Ksh

Table 4.9: ANOVA (through origin)

4.6.3 Model Coefficients

The t value in the regression measures the significance appropriateness of an explanatory variable (independent) in explaining the dependent variable. It is only worthy to interpret the t value when it is significant. The variables were subjected to a stepwise regression method. Stepwise regression flags significant and insignificant variables and computes them separately as shown in tables 4.10 and 4.11 below.

Regression using "stepwise" method

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-2884634.057	1359305.339		-2.122	.040		
	GDP_M_Ksh	2.467	.693	.500	3.563	.001	1.000	1.000

a. Dependent Variable: Tax_Revenue_M_Ksh

Table 4.10: Stepwise Regression sig.

From the stepwise regression in table 4.10 above, the GDP was significant at 0.01 in determining change in the dependent variable (tax revenue). GDP's t value of 3.56 showed changes in GDP led to noticeable changes in tax revenue. For every one unit increase in GDP there was a 2.46 (truncated) in tax revenue as illustrated in table 4.10 above. GDP was thus directly proportional to tax revenue.

Excluded Variables[a]

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics		
						Tolerance	VIF	Minimum Tolerance
1	Tax_Reforms	.025[b]	.120	.905	.020	.459	2.181	.459
	Exchange_Rate_Ksh	-.041[b]	-.124	.902	-.020	.184	5.428	.184
	Inflation	.031[b]	.220	.827	.036	.992	1.008	.992

a. Dependent Variable: Tax_Revenue_M_Ksh

b. Predictors in the Model: (Constant), GDP_M_Ksh

Table 4.11: Stepwise regression insig.

Table 4.11 above, part of the results of the stepwise regression, indicates the variables that were excluded due to their statistical insignificance. Nonetheless, they may not be totally insignificant given that their Variance Inflation factors were positive. The VIF of tax reforms of 2.2, exchange rate of 5.4, and inflation of 1 showed that the independent variables impacted, though not significantly, on tax revenue. With a t value of 0.12, tax reforms led to a slight increase in tax revenue. Exchange rate was inversely related to tax revenue as shown with the beta value of -0.41.

4.7 Discussion of Research Findings

Research findings showed that the data was normally distributed and moderately skewed. From the trend analysis over the study period of FY 2012/13 to FY 2021/22, tax revenue, GDP and exchange rate experienced mostly constant and steady increases to the tail end of the last quarter. GDP and tax revenue were lowest in the first quartile and highest in the last quartile showing great improvements and direct relationship between them. Inflation rates unpredictably fluctuated during the period with lows of approximately 3% and highest of approximately 10%. But for inflation, all other variables positively and significantly correlated with tax revenue.

The data lacked a true positive constant but regression from origin corrected the situation by reducing regression residual and increasing percentage of tax revenue determinable by predictor variables. Furthermore, the regression model tests with and without constant and using enter and stepwise methods were all significant. GDP was significant ($t=3.56$, $p=0.001$, $p<0.05$) in positively causing changes in tax revenue. All the other variables were not significant. Tax reforms, though with a positive coefficient, were not significant could be because the research only focused on post reforms quartile periods which were only a quarter (10 of 40 quartiles).

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This final chapter highlights the summary of findings, provides conclusions and recommendations on the findings of the study. It also provides the limitations of the study and ultimately suggestions for further research. It bases its deductions on the previous chapter.

5.2 Summary of Findings

The study was on effects of tax reforms on tax revenue and focused on KRA for the forty quartiles between 10 financial years of 2012/13 and 2021/22. Tax revenue formed the dependent variable while tax reforms, exchange rate, GDP and inflation the independent variables. The data was mostly moderately skewed and kurtik. The mean quartile tax revenue for the period was 1,921,638.56 million while for seasonally adjusted GDP 1,947,895.23. The mean exchange rate was Kshs. 101.91 to 1 USD and the 40 quartiles' inflation was highest at 10.79% but lowest at 3.53%. There was less fluctuations in the inflation level with the latest quartile's (Qrtl. 4, 2021/2022) inflation being 7.15%.

Trend analysis tests showed that Quarterly tax revenue from 2012/13 to 2021/22 experienced consistent sharp highs and lows between consecutive quartiles to the last quartile. Afterwards, the revenue rose steadily to its highest value of 4927479.32 million in the last quartile. The quarterly exchange rates varied between lows of slightly higher than Kshs 80 to 1 USD and highs of slightly higher than Kshs. 100 with the maximum being 116.34, an appearing in the last quartile. Unlike quartile tax revenues which had consistent "M" shape in its trend, the quarterly GDPs maintained steady but minimal growth between consecutive quartiles but for quartile 2 of

2020/2021. The decline in GDP growth rate in quartile 2 of 2020/21 can be attributed to among others, the Covid-19 pandemic, economic slowdown brought about by, inter alia, travel restrictions, loss of jobs and limited trade post the onset of Covid-19.

The correlation analysis between the dependent and predictor variables indicated various associations and disassociations. Tax reforms had a minimal positive significance ($p=0.016$, $p<0.05$) correlation of 0.38 with tax revenue. This implied that a 10% increase in tax reforms led to 3.8% increase in the tax revenue hence tax reforms positively impacts on tax revenue. Exchange rate was moderately correlated with tax reforms at 0.445 and significant ($p=0.01$, $p<0.05$). A moderate correlation showed that 1 unit change in exchange rate had effects on half a unit of tax revenue. GDP had a correlation of 0.5 with a p value of 0.01 which was significant ($p<0.05$). GDP was thus moderately positively correlated with tax revenue. Unlike all other independent variables, Inflation was negatively correlated with tax revenue at -0.14 but with an insignificance level ($p=0.93$, $P>0.05$). Nonetheless, the negative correlation indicated that an increase in inflation level reduced tax revenue.

The regression analysis (with constant) showed that when all independent variables (tax reforms, exchange rate, GDP, and inflation) were at zero, the dependent variable (tax revenue) was at a negative value. That showed that the constant for independent variable (tax revenue) lacked a true positive value. The model was significant ($p=0.33$, $p<0.05$) as shown in table 4.6 above. However, the R square value of 0.25 showed that only 25% of dependent variable was subjected to analysis due to the negative constant effect. The explanatory variable had a 0.503 effect on the

dependent variable showing that the factors (tax reforms, exchange rate, GDP, and inflation) had a half effect on a unit of the dependent variable.

A second regression through origin was conducted to correct the negative constant effect and increase the size of coverage of the analysis. The model, as shown on table 4.7, was significant ($p=0.00$, $p<0.05$) and enabled the increase of percentage of change on dependent variable by independent variable to 78.7% from 25% (53.7%). The results further showed that when combined, the independent variables led to 78.7% change in 0.887 unit of the tax revenue.

The Analysis of variance on regression through origin was significant ($p=0.00$, $p<0.05$) and had a high F value of 33.261. The sum of squares covered by the analysis was 271.84 compared the residual of 73.55(truncated) meaning that more of the dependent variable tax revenue was put into consideration. For a regression analysis to derive more meaning, the sum of regressed squares must be more than that of the residual hence the model was appropriately fit. The mean of regressed squares was 67.96 while that of residual 2.04.

Stepwise regression, as depicted in table 4.10 in chapter four, was applied in the interpretation of the model coefficients. The common enter method of regression usually computes all variables regardless of whether they are significant or otherwise. The stepwise method, likewise to enter method, considers all variables under study but on analysis, flags those that are insignificant in the study then computes them separately from those that are significant in the output display. The results showed that only GDP was significant ($p=0.01$, $p<0.05$) with a high t value of 3.56 which

and a beta of 0.5, and a B value of 2.46(truncated). This showed that changes in the GDP level moderately (0.5 beta) impacted on the tax revenue.

Though not significant in the study, the excluded variables tax reforms, exchange rate and inflation somewhat impacted on tax revenue. There high Variance inflation factor of 2.1, 5.4 and 1.0 for tax reforms, exchange rate, and inflation respectively as shown in table 4.11 showed that they were somewhat relevant for limited consideration. With a t value of 0.12 the tax reforms had a positive though very minimal impact on tax revenue and only affected 2.5% (beta 0.025) of the tax revenue analyzed. Tax reforms therefore lead to improvements in revenue collections through very minimally. Inflation had a very minimum VIF of 1 hence unworthy of consideration meaning that it hardly impacted on tax revenue for the 40 quartiles under study. Exchange rate on the other hand had a negative beta of -0.041 meaning that increases in Kshs. to 1 USD by say by 100% reduced tax revenue by 4.1%.

5.3 Conclusion

In conclusion, for the 40 quartiles under study between 10 financial years 2012/13 and 2021/22, only GDP had a significant impact on tax revenue. Although it caused insignificant changes, the variable tax reforms had a positive beta on stepwise regression with constant of 0.025 indicating that tax reforms indeed led to insignificant increases in tax revenue. The insignificant, though positive level of impact of tax reforms on tax revenue can be attributed to the fact that the research only focused on post onset on Covid 19 tax reforms. Post onset of tax reforms only covered 10 of the 40 quartiles commencing FY 2012/13 and ending FY 2021/22.

The study further concludes that GDP was the main determining factor and had a moderate positive impact on tax revenue. Increases in inflation and exchange rates lead to decreases in tax revenue. Tax reforms, the main variable under study, led to increases in tax revenue. Exchange rate was inversely proportional to tax revenue based on the negative regression outcome obtained. As such increases in exchange rates reduce the tax revenue.

5.4 Recommendations

The study recommends continuous revision and moderation of tax reforms to be in line with the true economic situations on the ground. Since improvements in tax reforms increases tax revenue collection, tax reforms should be sought with the view of enabling continuous sustainable substantive collection of taxes.

Concerted efforts, on finding the best combination of tax reforms by relevant authorities, should also be fast-tracked to improve collections of tax revenue. High tax revenue not only cushions the country against negative fiscal balances but ensuring proper running of government operations.

The government, through its relevant organs like the CBK, should guard the stability of the local currency against value dissipation relative to the dollar. This can be possible through increasing foreign currency reserves like the dollar and ensuring a favorable balance in the imports exports trades.

This study also recommends the guarding of the local currency against inflation. Increase in inflation lowers the tax revenue and thus any lawful strategy to keep inflation rates low would be beneficial to the economy. Such like strategies include regulation of general cash flow in the economy by the CBK through management of loan terms and caps, price controls, and currency print changes to get rid of old notes and coins and so forth.

Since the increases in the GDP increases tax revenue, GDP's steady growth trend should be maintained over above the last quartile of 2021/2022. This can be achieved through introduction of favorable trade environment, increasing the flow of goods and services, increasing export levels and increasing investments in the processing and manufacturing sectors of the economy.

5.5 Limitations of the study

Similar to most if not all studies, the research encountered limitations. The research findings were based only on one country's tax agency, the KRA. Researching on many agencies based in more than one country could have been an endless and resource-stripped endeavor. Nonetheless, one cannot rule out that possibility assuming resources were adequate.

The study period was limited to 10 years with focus on the 40 quartiles within it. Tax reforms were further limited to the post onset of Covid-19. An extended timeline would have been better to best depict the effect of tax reforms on tax revenue but for the fact that it could also be too quantitative and thus cumbersome to handle. The 40 quartiles were still sufficient in painting the almost true state of tax in the country since they extended to the very latest possible financial year of the study of 2021/22.

The variables used to determine the change in tax revenue were limited to tax reforms, exchange rate, GDP, and inflation. Truthfully speaking, many aspects may lead to an increase or otherwise of the tax revenue. Researching on every one of them would however be impossible though that does not rule out the need to increase on the number of independent variables.

5.6 Suggestions for Further Research

This study suggests the need to incorporate other tax measures like tax buoyancy and tax elasticity in the study of tax reforms effects on tax revenue. That way, annual tax response rate with and without the incorporation of tax reforms can be derived.

The study further suggests the extension of period of study to about 80 quartiles (20 years). 80 quartiles could not be possible in this study since the 40^{th} and last quartile of 2021/22 was the very latest for this study. A longer period of study increases analysis of coverage by the model of study hence giving more relevance to the study findings.

Lastly, the study suggests the inclusion of fiscal balance association with tax revenue in any further tax related study. That way, it would be known whether tax reforms have significant influences on altering the amount of fiscal balances, deficit or surplus, in a given economy.

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APPENDICES

Secondary Data on Tax Revenue, Exchange Rate, GDP, and Inflation

1) Secondary data sources websites and file links

		Secondary Data Sources					
	1)	**Monthly Total Tax Revenue: Central Bank of Kenya (Links)**					
Website: https://www.centralbank.go.ke/statistics/government-finance-statistics/#							
File : https://www.centralbank.go.ke/uploads/government_finance_statistics/508057315_Revenue%20and%20Expenditure.csv							
	2)	**Tax Reforms: Dummy (1 & 0)**					
	. for the Covid 19 Tax relief interventions in Kenya which lasted for 1 calendar year (2020						
	0 for Quartiles unaffected by the Covid 19 tax relief measures pre & post its onset						
	3)	**Exchange rate(XXX Kshs to 1 USD)**					
	a)	**CBK: Monthly exchange rate**					
Website: https://www.centralbank.go.ke/statistics/exchange-rates/monthly-exchange-rate-period-average/							
File: https://www.centralbank.go.ke/wp-content/uploads/2016/07/Monthly-Exchange-rate-period-average.csv							
	b) Ceic Data						
Exchange Rate: Ceic Data: Main alongside The above immediate							
	4)	**Quarterly GDP: Central Bank of Kenya sourced from KNBS (Seasonally adjusted)**					
Website: https://www.centralbank.go.ke/statistics/national-accounts-statistics/							
File: https://www.centralbank.go.ke/uploads/national_accounts_statistics/1330427363_QuarterlyGDP.csv							
	5)	**Inflation: KNBS,Central Bank of Kenya, World Bank, World Data**					
Link: https://www.centralbank.go.ke/inflation-rates/							
Website: Monthly inflation figures- KNBS Annual Surveys for years (2015, 2020, and 2022)							
Inflation Rate 2022							
Website: https://www.knbs.or.ke/download/consumer-price-indices-and-inflation-rates-for-october-2022/							
File: https://www.knbs.or.ke/download/consumer-price-indices-and-inflation-rates-for-october-2022/#							
Link:https://www.worlddata.info/africa/kenya/inflation-rates.php							
World Bank Kenya Inflation Rates							
Link: https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=KE							
	File:https://api.worldbank.org/v2/en/indicator/FP.CPI.TOTL.ZG?downloadformat=excel						

2) Monthly data on tax revenue, exchange rate, and inflation and quarterly GDP

Monthly data							Quarterly GDP
Measurement			M (Kshs.)	Kshs. To 1 USD	%		M(Kshs.)
FY	No.	Month	Tax Revenue	Exchange Rate	Inflation		2012/13-2021/22
2012/2013	1	July	40,394.79	84.15	7.74	1	1,565,450.00
	2	August	89,569.00	84.08	6.08	2	1,579,088.00
	3	September	151,061.54	84.61	5.32	3	1,603,190.00
	4	October	200,992.47	85.11	4.14	4	1,620,971.00
	5	November	255,823.23	85.63	3.25	5	1,626,387.00
	6	December	324,708.70	85.99	3.20	6	1,646,446.00
	7	January	380,793.29	86.90	3.67	7	1,661,933.00
	8	February	428,829.82	87.45	4.46	8	1,677,156.00
	9	March	483,594.14	85.82	4.11	9	1,707,778.00
	10	April	596,622.96	84.19	4.14	10	1,736,082.00
	11	May	625,523.58	84.15	4.05	11	1,748,492.00
	12	June	739,894.32	85.49	4.91	12	1,751,490.00
2013/2014	13	July	55,113.41	86.86	6.03	13	1,789,015.00
	14	August	121,100.04	87.49	6.68	14	1,819,036.00
	15	September	202,790.47	87.41	8.29	15	1,832,748.00
	16	October	267,075.71	85.31	7.77	16	1,848,329.00
	17	November	330,929.88	86.10	7.36	17	1,855,737.00
	18	December	416,965.75	86.31	7.15	18	1,888,081.00
	19	January	484,350.28	86.21	7.21	19	1,916,483.00
	20	February	540,829.64	86.28	6.85	20	1,936,414.00
	21	March	608,312.34	86.49	6.27	21	1,952,043.00
	22	April	697,685.76	86.72	6.40	22	1,948,859.00
	23	May	774,383.04	87.41	7.30	23	1,981,881.00
	24	June	851,804.13	87.61	7.39	24	2,005,534.00
2014/2015	25	July	61,395.11	87.77	7.67	25	2,049,192.00
	26	August	124,713.98	88.11	8.36	26	2,066,727.00
	27	September	216,264.15	88.84	6.60	27	2,092,941.00
	28	October	290,720.16	89.22	6.42	28	2,123,734.00
	29	November	357,398.36	89.96	6.08	29	2,146,446.00
	30	December	453,687.29	90.44	6.02	30	2,188,468.00
	31	January	558,210.80	91.36	5.52	31	2,206,075.00
	32	February	627,688.93	91.49	5.61	32	2,216,902.00
	33	March	699,070.44	91.73	6.31	33	2,237,371.00
	34	April	802,134.59	93.44	7.09	34	2,098,718.00
	35	May	881,031.81	96.39	6.87	35	2,139,380.00
	36	June	997,225.43	97.71	7.04	36	2,259,127.00
2015/2016	37	July	77,120.38	101.20	6.62	37	2,292,327.00
	38	August	153,420.59	102.43	5.84	38	2,332,145.00
	39	September	256,624.30	105.28	5.97	39	2,350,395.00
	40	October	336,953.08	102.79	6.72	40	2,417,238.00
	41	November	416,095.56	102.17	7.32		
	42	December	526,040.00	102.19	8.01		
	43	January	609,240.30	102.31	7.78		
	44	February	614,525.01	101.93	7.08		
	45	March	775,876.09	101.49	6.45		
	46	April	888,116.35	101.23	5.27		
	47	May	991,520.04	100.73	5.01		
	48	June	1,111,984.62	101.15	5.80		

2) Cont... Monthly data on tax revenue, exchange rate, and inflation and quarterly GDP

	49	July	81,052.67	101.33	6.40
	50	August	178,199.87	101.41	6.26
	51	September	289,029.16	101.27	6.34
	52	October	367,411.09	101.32	6.47
2016/2017	53	November	454,598.41	101.75	6.68
	54	December	591,170.56	102.13	6.35
	55	January	686,239.69	103.75	6.99
	56	February	773,149.26	103.64	9.04
	57	March	870,608.88	102.85	10.28
	58	April	991,996.20	103.33	11.47
	59	May	1,114,477.06	103.26	11.70
	60	June	1,253,462.72	103.50	9.21
	61	July	87,783.34	103.88	7.47
	62	August	187,765.67	103.56	8.04
	63	September	317,416.26	103.12	7.05
	64	October	405,211.04	103.39	5.72
2017/2018	65	November	508,700.42	103.56	4.73
	66	December	630,367.76	103.10	4.49
	67	January	755,215.44	102.92	4.84
	68	February	836,019.44	101.40	4.46
	69	March	939,349.02	101.18	4.18
	70	April	1,056,799.05	100.61	3.73
	71	May	1,170,271.00	100.67	3.95
	72	June	1,311,692.29	101.01	4.28
	73	July	98,782.92	100.67	4.35
	74	August	205,134.67	100.61	4.04
	75	September	329,337.39	100.83	5.70
	76	October	439,936.20	101.07	5.54
2018/2019	77	November	555,765.71	102.36	5.59
	78	December	680,755.82	102.29	5.71
	79	January	805,372.39	101.58	5.19
	80	February	899,899.33	100.23	4.13
	81	March	1,018,512.77	100.36	4.28
	82	April	1,155,316.00	101.07	3.71
	83	May	1,289,255.43	101.15	3.49
	84	June	1,440,212.73	101.69	4.84
	85	July	107,104.69	103.16	6.10
	86	August	218,898.04	103.29	5.99
	87	September	371,451.81	103.80	5.08
	88	October	497,243.32	103.67	6.26
2019/2020	89	November	610,555.13	102.39	7.10
	90	December	756,648.81	101.53	7.16
	91	January	874,538.92	101.09	6.87
	92	February	972,065.94	100.80	7.17
	93	March	1,096,245.28	103.74	5.84
	94	April	1,214,556.07	106.41	6.01
	95	May	1,304,259.51	106.66	5.32
	96	June	1,427,507.57	106.40	4.59

2) Cont... Monthly data on tax revenue, exchange rate, and inflation and quarterly GDP

	97	July	94,426.29	107.27	4.35
	98	August	187,246.35	108.14	4.35
	99	September	316,774.16	108.41	4.19
	100	October	425,291.92	108.64	4.84
2	101	November	523,515.17	109.27	5.33
0	102	December	668,693.00	110.54	5.62
2	103	January	779,269.81	109.83	5.70
0	104	February	900,348.39	109.68	5.78
/	105	March	1,030,486.73	109.73	5.90
2	106	April	1,188,173.20	107.95	5.77
0	107	May	1,310,477.04	107.43	5.87
2	108	June	1,484,759.69	107.81	6.32
1	109	July	121,687.85	108.14	6.55
	110	August	246,875.08	109.24	6.58
	111	September	416,365.68	110.13	6.92
	112	October	547,756.63	110.86	6.45
2	113	November	687,281.69	111.92	5.80
0	114	December	867,872.15	112.91	5.72
2	115	January	1,010,496.28	113.38	5.38
1	116	February	1,125,094.66	113.66	5.09
/	117	March	1,281,623.15	114.32	5.56
2	118	April	1,454,363.18	115.44	6.47
0	119	May	1,635,894.98	116.28	7.08
2	120	June	1,837,221.17	117.29	7.91
2					

3) Quarterly data on the variables (with tax revenue in absolute form)

Measurement		Million	Dummy	Rate(%)	Million	Rate(%)
FY	Qrtl.	Tax Revenue	Tax Reforms	Exchange Rate	GDP(M Ksh)	Inflation
	1	281,025.33	0	84.28	1,565,450.00	6.38
	2	781,524.40	0	85.58	1,579,088.00	3.53
	3	1,293,217.25	0	86.72	1,603,190.00	4.08
2012/2013	4	1,962,040.86	0	84.61	1,620,971.00	4.37
	5	379,003.92	0	87.26	1,626,387.00	7.00
	6	1,014,971.34	0	85.91	1,646,446.00	7.43
	7	1,633,492.26	0	86.33	1,661,933.00	6.78
2013/2014	8	2,323,872.93	0	87.25	1,677,156.00	7.03
	9	402,373.24	0	88.24	1,707,778.00	7.54
	10	1,101,805.81	0	89.88	1,736,082.00	6.18
	11	1,884,970.17	0	91.52	1,748,492.00	5.81
2014/2015	12	2,680,391.83	0	95.84	1,751,490.00	7.00
	13	487,165.27	0	102.97	1,789,015.00	6.14
	14	1,279,088.64	0	102.38	1,819,036.00	7.35
	15	1,999,641.40	0	101.91	1,832,748.00	7.11
2015/2016	16	2,991,621.01	0	101.04	1,848,329.00	5.36
	17	548,281.70	0	101.34	1,855,737.00	6.33
	18	1,413,180.06	0	101.73	1,888,081.00	6.50
	19	2,329,997.83	0	103.41	1,916,483.00	8.77
2016/2017	20	3,359,935.98	0	103.36	1,936,414.00	10.79
	21	592,965.27	0	103.52	1,952,043.00	7.52
	22	1,544,279.22	0	103.35	1,948,859.00	4.98
	23	2,530,583.90	0	101.83	1,981,881.00	4.49
2017/2018	24	3,538,762.34	0	100.76	2,005,534.00	3.99
	25	633,254.98	0	100.71	2,049,192.00	4.70
	26	1,676,457.73	0	101.91	2,066,727.00	5.61
	27	2,723,784.49	0	100.73	2,092,941.00	4.54
2018/2019	28	3,884,784.16	0	101.30	2,123,734.00	4.01
	29	697,454.55	0	103.42	2,146,446.00	5.72
	30	1,864,447.25	0	102.53	2,188,468.00	6.84
	31	2,942,850.14	1	101.88	2,206,075.00	6.63
2019/2020	32	3,946,323.14	1	106.49	2,216,902.00	5.31
	33	598,446.80	1	107.94	2,237,371.00	4.30
	34	1,617,500.09	1	109.48	2,098,718.00	5.26
	35	2,710,104.93	1	109.75	2,139,380.00	5.79
2020/2021	36	3,983,409.92	1	107.73	2,259,127.00	5.99
	37	784,928.61	1	109.17	2,292,327.00	6.68
	38	2,102,910.47	1	111.90	2,332,145.00	5.99
	39	3,417,214.08	1	113.79	2,350,395.00	5.34
2021/2022	40	4,927,479.32	1	116.34	2,417,238.00	7.15
Total (100%)		76,865,542.63			77,915,809.00	

4) Quarterly data on all variables with tax revenue expressed as a percentage

Measurement		(%) Summed TR	Dummy (1,0)	Rate (%)	(%) Summed GDP	Rate (%)
FY	Qrtl.	Tax Revenue	Tax Reforms	Exchange Rate	GDP(% Total)	Inflation
	1	0.37	0	84.28	2.01	6.38
	2	1.02	0	85.58	2.03	3.53
	3	1.68	0	86.72	2.06	4.08
2012/2013	4	2.55	0	84.61	2.08	4.37
	5	0.49	0	87.26	2.09	7.00
	6	1.32	0	85.91	2.11	7.43
	7	2.13	0	86.33	2.13	6.78
2013/2014	8	3.02	0	87.25	2.15	7.03
	9	0.52	0	88.24	2.19	7.54
	10	1.43	0	89.88	2.23	6.18
	11	2.45	0	91.52	2.24	5.81
2014/2015	12	3.49	0	95.84	2.25	7.00
	13	0.63	0	102.97	2.30	6.14
	14	1.66	0	102.38	2.33	7.35
	15	2.60	0	101.91	2.35	7.11
2015/2016	16	3.89	0	101.04	2.37	5.36
	17	0.71	0	101.34	2.38	6.33
	18	1.84	0	101.73	2.42	6.50
	19	3.03	0	103.41	2.46	8.77
2016/2017	20	4.37	0	103.36	2.49	10.79
	21	0.77	0	103.52	2.51	7.52
	22	2.01	0	103.35	2.50	4.98
	23	3.29	0	101.83	2.54	4.49
2017/2018	24	4.60	0	100.76	2.57	3.99
	25	0.82	0	100.71	2.63	4.70
	26	2.18	0	101.91	2.65	5.61
	27	3.54	0	100.73	2.69	4.54
2018/2019	28	5.05	0	101.30	2.73	4.01
	29	0.91	0	103.42	2.75	5.72
	30	2.43	0	102.53	2.81	6.84
	31	3.83	1	101.88	2.83	6.63
2019/2020	32	5.13	1	106.49	2.85	5.31
	33	0.78	1	107.94	2.87	4.30
	34	2.10	1	109.48	2.69	5.26
	35	3.53	1	109.75	2.75	5.79
2020/2021	36	5.18	1	107.73	2.90	5.99
	37	1.02	1	109.17	2.94	6.68
	38	2.74	1	111.90	2.99	5.99
	39	4.45	1	113.79	3.02	5.34
2021/2022	40	6.41	1	116.34	3.10	7.15

5) Consumer Price Indices (KNBS)

		Overall Consumer Price Indices for the Period of study (KNBS)										
		Base: February 2009=100							*Base: February 2019=100*			
	2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
January		130.82	135.62	145.40	153.43	165.37	90.37	94.74	99.66	106.51	112.58	118.64
February		130.76	136.59	145.95	154.14	165.06	91.93	96.03	100.00	107.17	113.36	119.13
March		132.51	137.96	146.61	155.86	165.92	93.46	97.37	101.54	107.47	113.81	120.14
April		133.74	139.28	148.20	158.70	167.07	95.13	98.68	102.34	108.49	114.75	122.17
May		134.09	139.52	149.70	159.98	167.99	95.84	99.63	103.11	108.60	114.98	123.12
June		133.06	139.59	149.91	160.46	169.76	94.69	98.74	103.52	108.27	115.11	124.22
July	122.44	131.92	139.87	150.60	160.57	170.84	93.78	97.86	103.83	108.35	115.45	
August	123.97	131.51	140.29	152.02	160.90	170.97	94.35	98.16	104.04	108.57	115.71	
September	125.23	131.89	142.82	152.24	161.33	171.56	93.81	99.16	104.20	108.57	116.08	
October	127.20	132.46	142.75	151.92	162.13	172.62	93.22	98.38	104.54	109.60	116.67	
November	129.13	133.33	143.14	151.85	162.97	173.85	93.00	98.20	105.17	110.78	117.20	
December	130.09	134.25	143.85	152.51	164.72	175.18	93.50	98.84	105.92	111.87	118.27	
Annual Av	****	**132.53**	**140.1**	**149.7**	**159.6**	**169.7**	**93.6**	**98**	**103.2**	**108.7**	**115.3**	*****

	N/B: KNBS reported 2 sets of Consumer Price Indices for the year 2017											
	(Inflation adjusted according to national standards.											
	Below column used for calculating inflation rate for year 2017											
	2017											
January	176.93											
February	179.98											
March	182.98											
April	186.24											
May	187.64											
June	185.39											
July	183.60											
August	184.72											
September	183.66											
October	182.50											
November	182.08											
December	183.05											
Annual Av	**183.23**											

6) Comprehensive Monthly, Annually, and Quarterly Inflation Calculation using Consumer Price indices

Monthly and Annual Inflation Rates calculation

$CMIR_{yyy} = [(CMCI_{YYY} - PSMCI_{YYY-1})/(PSMCI_{YYY-1})] * 100$

Where:

CMIR = Current month Inflation rate,

CMCI = Current month Consumer Index from Table above,

PSMCI = Past same month consumer index (e.g February of past year

YYY= Current year; and

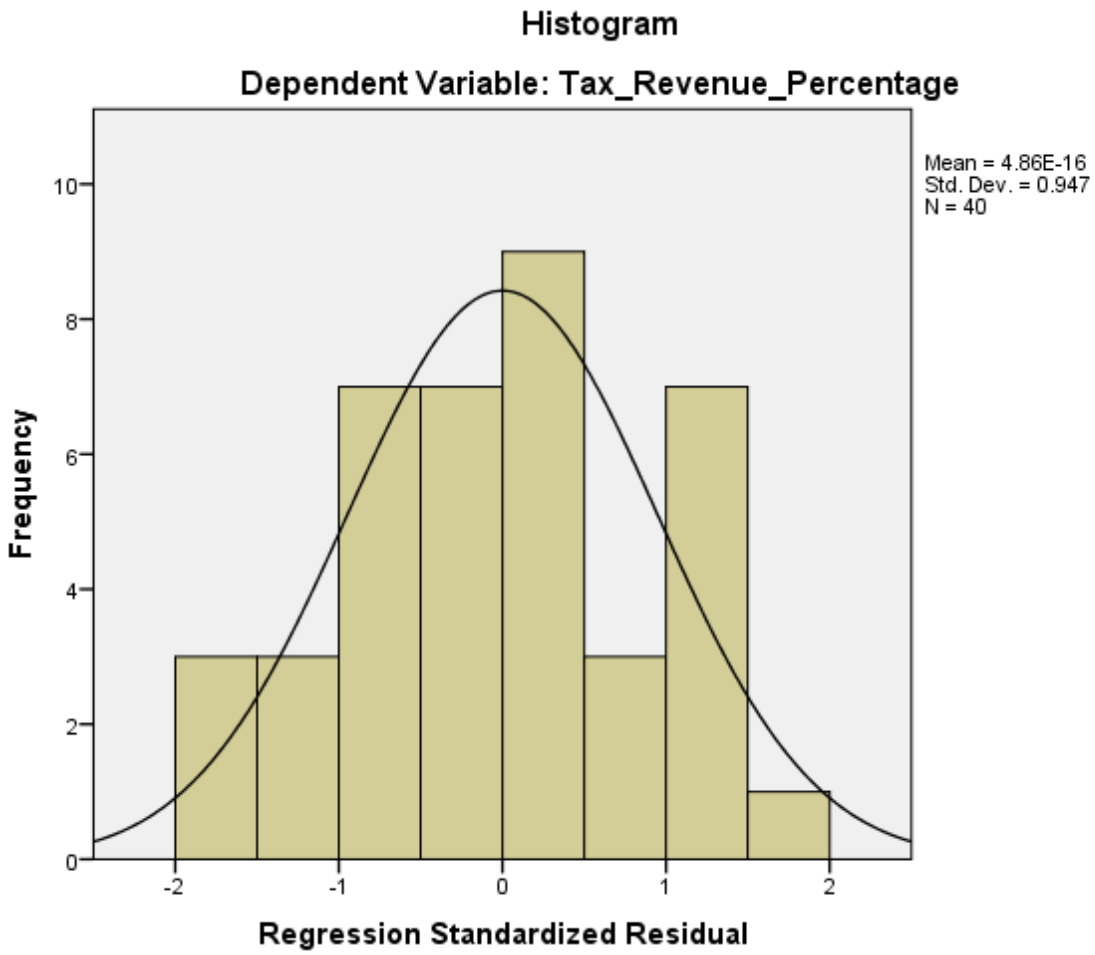
yyy-1= Immediate previous year

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
January		3.67	7.21	5.52	7.78	6.99	4.84	5.19	6.87	5.70	5.38
February		4.46	6.85	5.61	7.08	9.04	4.46	4.13	7.17	5.78	5.09
March		4.11	6.27	6.31	6.45	10.28	4.18	4.28	5.84	5.90	5.56
April		4.14	6.40	7.09	5.27	11.47	3.73	3.71	6.01	5.77	6.47
May		4.05	7.30	6.87	5.01	11.70	3.95	3.49	5.32	5.87	7.08
June		4.91	7.39	7.04	5.80	9.21	4.28	4.84	4.59	6.32	7.91
July	7.74	6.03	7.67	6.62	6.40	7.47	4.35	6.10	4.35	6.55	
August	6.08	6.68	8.36	5.84	6.26	8.04	4.04	5.99	4.35	6.58	
September	5.32	8.29	6.60	5.97	6.34	7.05	5.70	5.08	4.19	6.92	
October	4.14	7.77	6.42	6.72	6.47	5.72	5.54	6.26	4.84	6.45	
November	3.25	7.36	6.08	7.32	6.68	4.73	5.59	7.10	5.33	5.80	
December	3.20	7.15	6.02	8.01	6.35	4.49	5.71	7.16	5.62	5.72	
Annual Av.	****	**5.717**	**6.882**	**6.576**	**6.324**	**8.02**	**4.7**	**5.279**	**5.375**	**6.112**	*****

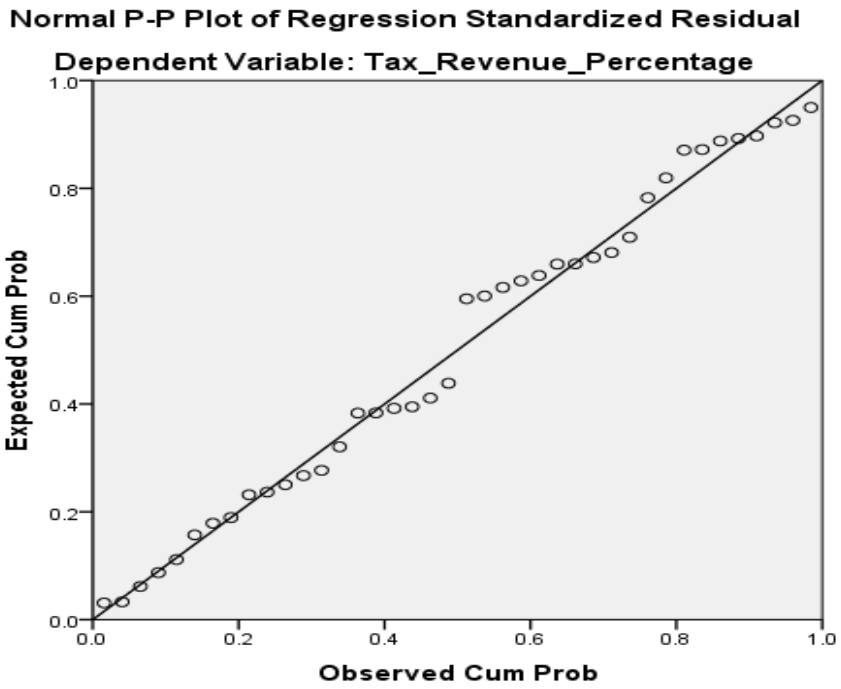
7) Quarterly data standardization technique

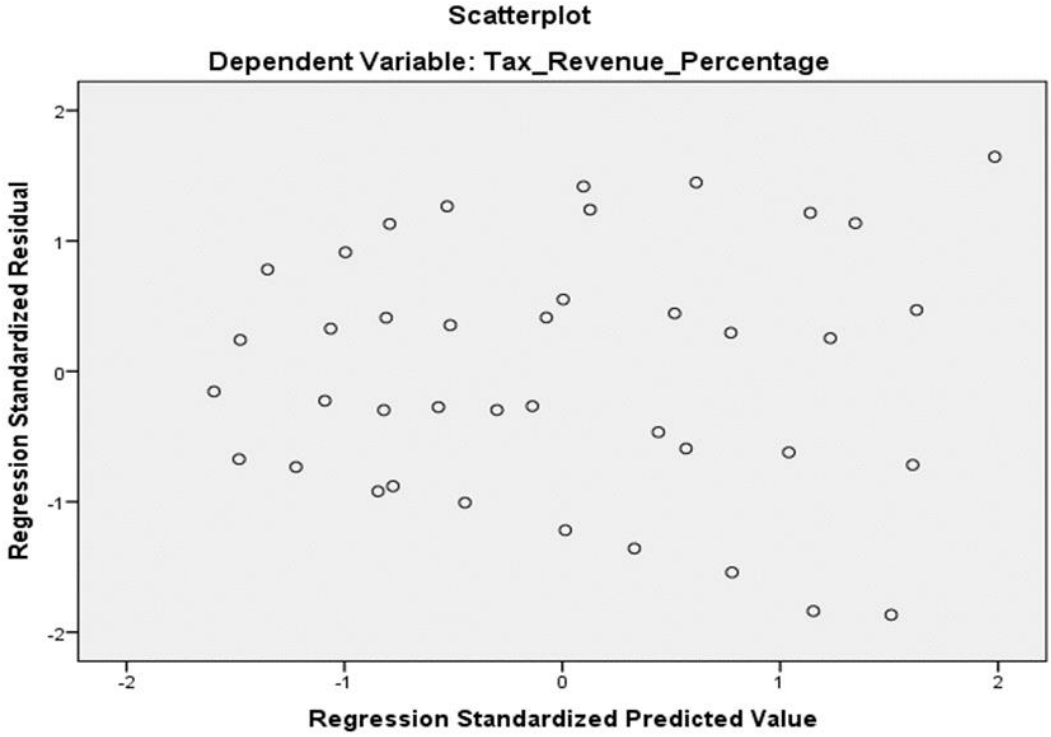
		Quarterly data with Tax revenue in absolute form	
NB: i) GDP values were sourced in quarterly amounts from CBK,			
ii) Qurterly Tax revenues derived from summing monthly revenue			
iii) Quarterly Exchange and Inflation rates derived by averaging monthly rates			
ii) Dummy variable of 0 and 1 used for tax reforms. 1 represented post onset of Covid 19 period.			
iii) Comprehensive monthly inflation calculations included in the appendices			

8) Normality Plots



Histogram on Tax Revenue Regression Standardized Residual plot


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Tax_Revenue_Percentage
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Scatterplot
Dependent Variable: Tax_Revenue_Percentage
Regression Standardized Residual
Regression Standardized Predicted Value
-2
-1
0
1
2

G

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