MODERATING INFLUENCE OF TECHNOLOGY ADOPTION ON THE RELATIONSHIP BETWEEN TRADE LIBERALIZATION AND TAX PERFORMANCE IN KENYA

BY

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ABSTRACT

Tax revenue is a major source of government revenue all over the world as it aids the government in the maintenance of political, social and economic objectives. However, based on the recent tax collections, it is evidenced that the tax revenues in Kenya are underperforming primarily because of tax administration. Due to this conceptual gap, the study examined the moderating effect of ICT usage and trade liberalization on government tax revenues in Kenya. The study had the following objectives; to assess the effect of trade openness on government tax revenues in Kenya; to establish the impact of international trade on government tax revenues in Kenya; to determine the effect of foreign direct inflows on government tax revenues in Kenya; and to moderating effect ICT usage on trade liberalization and government tax revenues in Kenya. The study was underpinned by the theory of public finance and public choice and the theory of competitive advantage. The study adopted an explanatory research design and used secondary data sources from the Kenya National Bureau of Statistics (KNBS) and the Central Bank of Kenya and UN Comtrade as the sources of information. The researcher used secondary data that span 32 years from 1990 to 2021 because of the sampling adequacy for the regression modelling. Data was analysed descriptively and inferentially before it is presented in tabular format. The descriptive statistics showed that the tax revenues on consumption have grown from 85% in the 1990s to 90% of government tax revenue in 2021 while non–tax revenues have averaged 15% in the 1990s to 10% of government tax revenue in 2021. The indications are that tax collections have largely lagged behind the GDP growth. The trade openness ratio has constantly dropped from over 55% in 2012 to 24% in 2019. The tax ratio has dropped from 20% in 1994 to 8% in 2021, while the trade tariffs have averaged 8% in 2004 and 2021, while the FDI: GDP ratio is marginal and has stayed relatively below 5%. Based on the regression analysis, the trade openness ($\beta_1 = 0.5547$; $t = 8.73$, $p < 0.00$) and trade tarrifs ($\beta_2 = 0.6422$; $t = 10.15$, $p < 0.00$) and ICT usage ($\beta_4 = -0.7889$; $t = -2.60$, $p < 0.05$), were statistically significant while FDI ($\beta_3 = -0.0585$; $t = -0.89$, $p > 0.00$) was not significant in explaining the changes in tax revenue. The study findings showed that the ratio of external trade and international taxes has a positive effect on tax revenue while the ratio of FDI does not. ICT usage has a negative moderating effect on tax revenue. Based on the findings the study rejected H_{01}, H_{02} and Ho_4 but does not reject H_{03} and concludes that trade openness and Trade Tariff have a positive impact on tax revenue in Kenya, while FDI does not. ICT usage has a negative moderating effect on tax revenue. The study recommends that the government tax agency seeks to improve the volumes of direct taxes and make ICT usage pervasive throughout the organization, while the government introduce a favourable tax policy.

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ACRONYMS AND ABBREVIATION

ARDL:	Autoregressive Distributive Lag
EU:	European Union
FDI:	Foreign Direct Investment
GMM:	Gaussian Mix Model
GDP	Gross Domestic Product
GRD	Government Revenue Dataset
ICTD:	International Centre for Tax and Development
KRA:	Kenya Revenue Authority
MENA:	Middle East and North Africa
OECD:	Organization for Economic Co-operation and Development
VAT:	Value-Added Taxes

OPERATIONAL DEFINITION OF TERMS

Exports	The share of commodities and services sold to other countries includes physical goods and tradable services (Eichengreen & Gupta, 2013).
Foreign Direct inflows:	Trade and capital flows into a country and include investments that are denominated in major world currencies such as the US dollar (Cole, Elliott & Zhang, 2017).
International trade	The global share of trade in terms of commodities and services including exports and imports between different nations (Kowalski & Perepechay, 2015).
Tax revenue	Totality of taxes in the form of direct taxes (personal, income taxes and capital gains) and indirect taxes (Value Added Tax, excise tax, property tax, and Customs duties among other indirect taxes as a source of government revenue (Baunsgaard & Keen, 2010).
Trade openness	The measure of trade volumes and restrictions concerning international trade volume (Huchet-Bourdon, Le Mouël & Vijil, 2018).
Trade liberalization	The removal or reduction of trade restrictions or barriers on the free exchange of goods between nations. These barriers include tariffs, such as duties and surcharges, and nontariff barriers, such as licensing rules and quotas (Dix-Carneiro & Kovak, 2017).

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Taxation is one of the cornerstones of all political regimes (Kenny & Winer, 2016). The taxation structure signals the measures for state capacity, state formation and power relations in society (Di John, 2016). The tax revenue collection reflects the constant investment in tax reforms in the following ways; the introduction of value-added taxes (VAT), the adoption of advanced tax administration practices and more autonomy for tax collection agencies (Prichard, Cobham, & Goodall, 2014). The capacity of the state to mobilize resources beyond taxation is one important feature of developmental success stories, in particular, high levels of gross domestic savings have supported robust investment rates. However, there is no explanation as to why tax capacities differ across countries (Di John, 2016).

Effectiveness in tax revenue collection efforts is attributable to the development of linkages or cooperation from a wide range of stakeholders that include government ministries, departments and agencies which may include the government treasury and other ministries; autonomous agencies for registering businesses, motor vehicles, business and property; public utilities, public procurement agencies; the policing services, judiciary and public prosecution, and private sector organization such as insurance bodies, business association and professional bodies (Moore, 2014). The more that tax collection is based on analysis of accounts rather than on physical verification the greater the need for cooperation with these other stakeholders.

Empirical studies of optimal taxation explicitly acknowledge informational constraints but implicitly assume a bureaucracy able and willing to enforce any tax

policy respecting those constraints (Besley & Persson, 2014). Government tax revenues are affected by several internal and external factors. The internal factors include the efficiency of the tax administration, and resource endowment, while the external factors include the GDP per capita, trade openness and population. Usually, the higher GDP per capita, the bigger the consumption of goods and services, and therefore, more tax revenues. Likewise, the more the country is open to trade, the more it can raise taxes on imports as well as exports. Similarly, the higher the population, the higher consumption will be, and hence, the higher the potential tax revenues (Yogo & Ngo Njib, 2018).

Other challenges in tax collection in countries with natural resources such as minerals and oil. The model premises on the fact that states that are deriving a large proportion of revenues from external sources are more likely to have reduced necessity to levy domestic taxes, and thus are more likely to accommodate rent-seeking and corruption (Di John, 2016). Improvements in the institutional capacity to collect taxes were brought about by a mixture of institutional reforms, the spread of elementary education, the adaptation of modern record-keeping, and economic and social progress in general. This reduced the transaction cost of collecting more complex taxes, such as the personal income tax, that required taxpayers to keep detailed records and the tax authorities to audit self-assessed tax returns (Aidt & Jensen, 2015). Yogo and Ngo Njib (2018) observed that the efficiency of the tax administration positively correlated with tax revenues such that an increase in efficiency would increase the total tax revenues collected within a state.

Tax revenue collections are also hindered by the nature of the classification systems. For instance, Prichard, Cobham and Goodall (2014) observed that many countries still maintain their tax clusters as either direct or indirect taxes or revenue or non–revenue taxes. The direct taxes include Taxes on Incomes, Profits and Capital Gains) which are simply classified as taxes on individuals and corporations and Property Taxes, while the indirect taxes are taxes on goods and services (Sales/tax or VAT and Excise) and Trade Tariff which are largely taxes on Imports and Exports and other taxes.

In developed economies, states with high per capita incomes and high ratios of international trade to GDP and highly diversified economies with low proportions of non-agricultural activity consistently garner a high proportion of national income in tax. The tax revenues in Western Eurozone countries have largely increased due to the rise in government spending. The most notable was the rise of direct taxes including the personal income tax and the decline of indirect taxes including tariffs and excise duties as the main source of revenue (Moore, 2014). For instance, the tax-to-GDP ratio in Albania has risen from 10% in 1996 to 24% in 2009 (Seelkopf, Lierse & Schmitt, 2016).

These changes took place against the backdrop of democratization and significant advances in the institutional capacity to collect broad-based and complex taxes at low administrative costs (Aidt & Jensen, 2015). Most OECD countries have separate units for dealing with large taxpayers a practice that has been replicated in more than half of the Anglophone countries. In effect, the structuring of the taxpayers into segments

seems to have benefits but their effectiveness varies from country to country (Moore, 2014).

IMF 2010 statistics indicated that the average total tax collection varies from region to region and from economy to economy. For instance, OECD-high economies have an average tax-to-GDP ratio of 25% to 28%, while their non – OECD counterparts collect an average tax-to-GDP ratio of 12% to 17%. The upper-middle-income countries have an average tax-to-GDP ratio of 14.5% to 18%, while lower-middle-income countries have an average tax-to-GDP ratio of 14% to 16% and lower-income countries have an average tax-to-GDP ratio of 9% to 13% (Prichard *et al.*, 2014).

In terms of total tax collection, OECD countries collect a minimum tax of 26% GDP, Middle East and North Africa (MENA) countries collect an average total tax of 20% GDP, Latin America collects an average total tax of 18% GDP, Eastern European countries collect an average tax of 17% GDP, while Asia countries collect an average total tax of 13 to 15% while Sub-Saharan Africa collects an average total tax of 12% GDP (Gnangnon & Brun, 2019).

High-income countries depend more on income taxes and many of them do not use trade taxes at all, while middle-income countries and, especially, low-income countries use trade taxes much more (Baunsgaard & Keen, 2015). The tax revenue as a proportion of GDP is typically much lower in developing countries than in rich countries. The difference in tax revenues between high- and low-income countries is entirely explained by the weakness of direct taxation in developing countries. For instance, direct taxation represents 7% of GDP in Sub-Saharan Africa and 22% in industrial countries. In comparison, indirect taxation in developing countries is

roughly 10% of GDP, which is the same level as in industrialized countries (Auriol & Warlters, 2015).

Estimates show that there has been a steady increase in tax revenues in developing countries in the last decade. The latest statistics on developing countries from the International Centre for Tax and Development (ICTD) show that non-resource taxes increased from 13 per cent of gross domestic product (GDP) in 1990 to 16 per cent in 2009. This progress in the mobilization of domestic revenues is consistent across developing regions and mirrored by the evolution of non-resources tax collection that has also improved in sub-Saharan Africa over this period (Yogo & Ngo Njib, 2018).

Empirical data suggests the progress in revenue mobilization efforts has been most rapid among low-income countries, most notably in Africa. While tax collection has increased among all groups of developing countries, the rate of increase has been highest among low-income countries, where non-resource tax collection has increased about 30 per cent, from less than 10 per cent of GDP to almost 13 per cent of GDP. This increase is mirrored by trends in Sub-Saharan Africa, where average non-resource tax collection has increased from less than 12 per cent of GDP to more than 15 per cent. This same trend for Sub-Saharan Africa is sustained, though at lower levels (Prichard *et al.,* 2014).

Empirical evidence shows that indirect taxes, and in particular VAT, which is generally one of the more regressive taxes, occupy a relatively higher share of the overall tax burden in Latin America (Di John, 2016). Tax revenues are also explained by the historical colonial legacies. For instance, the British Caribbean countries

inherited legal institutions that enabled the development of more formal labour markets which can explain, in part, the higher capacity of these countries to collect income tax compared to Central and South American economies (Di John, 2016).

Empirical evidence shows that Brazil in the twentieth century had the higher total tax-to-GDP ratio in Latin America. For instance, between 1990 and 2004, the ratio increased from 22 per cent of GDP to over 30 per cent of GDP (Di John, 2016). In segregating the different taxes, Di John (2016) pointed out that there were differences between Latin American and East Asian economies during 1997-2002 in terms of the share of direct taxes collected as a percentage of GDP. During this period, the personal income and property tax collected in East Asia was, on average, 4 times higher as a proportion of national income than it was in Latin America. Moreover, the share of personal income and property tax as a percentage of GDP was six times higher in Eastern Europe compared with Latin America's average.

Other regions with significant progress in the tax efforts include Latin America where the data shows that the region has largely increased average tax collection increasingly steadily from less than 13 per cent of GDP in 1990 to almost 18 per cent of GDP in 2009. South Asia nations are the worst-performing region globally in terms of aggregate levels of tax collection and also experience the most limited increase in collection over the two decades but its tax revenue collection performance is comparable to other developing regions (Prichard, Cobham and Goodall, 2014). South Africa, Brazil, and Malaysia have historically high tax to GDP ratio as characterized by strong political systems Evidence show that between 1960 and 2000, the tax revenues to GDP ratio in South African tax collection has consistently been the highest among middle-income countries. In the period between 1997 and 2002, this

ratio averaged over 25 per cent compared with the middle-income country average of 15 per cent of GDP (Di John, 2016).

The total tax revenue collections in Africa are not reliable and often revised. The overall tax revenue collections, as a percentage of GDP, tend to be low in Sub-Saharan Africa due to the low incomes. Globally, there is a strong and robust statistical association between the structure of national economies and the proportion of national income raised in taxes (Moore, 2014). In sub-Saharan Africa, the colonial economic development and in particular the structure of labour markets and the historical process of the integration of indigenous populations into the colonial order appears to have had a differential impact on the tax collection capacities. For instance, there are regional differences in the share of the tax revenues to GDP in the Southern African states of South Africa, Zimbabwe, Botswana and Namibia having generally higher tax takes and tax effort indicators than would be predicted based on their per capita incomes (Madzivanyika, 2016).

The average tax revenue collections in sub-Saharan Africa as a proportion of the GDP stagnated or declined from the 1970s to 1990s. This scenario changed a bit in the 1990s with a significant increase in collections from 2005 onwards (Moore, 2014). In Uganda, Rwanda and DRC, the tax bases are relatively low and largely depend on trade taxes with an extremely small number of large taxpayers contributing between 40 and 70 per cent of the total domestic taxes (Di John, 2016). The Ghana tax to GDP ratio has risen from less than 8% in 1990 to more than 14% in 2004 and dropped to approximately 13% in 2010., The result is that, for example, reported tax collection in Ghana declines from 20.6 per cent of GDP in 2005 to 12.8 per cent in 2006 as a result

of a break in the underlying GDP series. More broadly reflective of the lack of attention to the importance of underlying GDP series is that the 2010 report noted above does not report which GDP figures are employed in calculating tax shares of GDP (Prichard, Cobham and Goodall, 2014).

Ideally, the minimum threshold tax to GDP ratio for developing countries is about 15 per cent and any failure to reach the 15 per cent level, or any other, is likely to be associated with weaker development outcomes. Evidence shows that forty-two countries had a tax-to-GDP ratio of below 15 per cent. For example, when Ghana rebased its economy, its tax-to-GDP ratio dropped from 15 per cent in 2009 to less than 15 per cent thereafter. The rebasing in Nigeria lead to a significant decline in tax collection, while a rebase in Zambia in 2014 saw the tax-to-GDP ratio drop to below 15 per cent (Madzivanyika, 2016).

Few Sub-Saharan African governments can collect a high tax ratio to GDP. However, there is a caveat to these in that Anglophone countries tend to score well in terms of tax effort, i.e., the actual tax collection levels relative to the levels expected to achieve given the structure of their national economies (Moore, 2014). For instance, the tax revenue collections in East African community members are plateauing. The tax-to-GDP ratio in Rwanda rose from 3.6% in 1994 to 15% in 2002 and has since fluctuated between 13% and 15%. In Uganda, the tax-to-GDP ratio increased from 6.8& in 1992 to 12.1% in 2000 and has since plateaued at that level (Moore, 2014). The latest statistics indicate that Uganda's tax revenue GDP ratio stands at 13.4 per cent and it remained at this level for the last 10 years, while the average tax revenue to GDP for the East African community is about 18.1 per cent (Gaalya, 2015).

The data in Table 1.1(Appendix 1) relates to the average tax revenue types for the period 1990 to 2010. The data shows that upper middle–income economies collect an average of 25 per cent of GDP while developing countries collect an average of 20% of GDP. The tax revenues (both direct and indirect taxes) make up more than two-thirds of the total taxes collected while non-tax revenues comprise resource royalties and social constitutions make up the remaining third. The indirect taxes (customs, VAT, sales tax and excise) are two times the direct taxes (personal and corporate income and property taxes) (Prichard *et al.,* 2014).

The data in Table 1.2 (Appendix 1) relates to the average tax revenue types for the period 1990 to 2010. The data shows that the Middle East and North Africa (MENA) economies collect an average of 30 per cent GDP, while Eastern Europe, Central, East and South-East Asia countries collect an average of 2 per cent GDP. Latin American countries collect an average of 21 per cent of GDP, Sub-Saharan Africa collects an average of 20 per cent of GDP, while South Asian Countries' collection lags at 16% of GDP. Tax revenues are the dominant form of taxes in all the regions making between 50 % (in the MENA region) to 80 % (in East and South-East Asia) (Prichard *et al.,* 2014).

The non-tax revenues make up between 23 % (in Eastern Europe, and Central Asia), 24 % (in Latin America, East and South-East Asia) to 50 % (in MENA region). The other two regions of Sub-Saharan Africa and South Asia have median figures of about 33 per cent. The differences are explained by the presence of natural resources such as oil and other minerals which are considered to be non-revenue tax resources. Evidence indicates that a 1 per cent increase in the share of natural resource rents in

total government income is associated with a 1.4 per cent lower share of taxation in GDP (Baunsgaard & Keen, 2015)

The information in Appendix 1 distinguishes the tax collections into tax revenues and non-tax revenues. The tax revenues are largely the direct tax (income, corporate and capital gains) and indirect taxes (VAT, taxes on other goods that includes excise tax, taxes on financial and capital transactions, taxes on international trade) and non-tax revenues (Government fiscal revenues, property income, sales of goods and services, fines, penalties and forfeitures, repayments and other unclassified receipts) (KNBS, 2008 – 2021)

Direct taxes comprise more than a third of all tax collections (i.e., 34.81% in 2004/2005 to 38.88% in 2019/2020) to four–tenths of tax revenues (i.e., 37.58% in 2004/2005 to 45.65% in 2019/2020). The tax revenues comprise over 90% of all tax collections except for 2019/2020 (85.16%). The growth in tax collection has largely been driven by the growth in the amounts of direct taxes which has risen from 34.81% in 2004/2005 to 40.35% in 2018/2019) (KNBS, 2008 – 2021).

In Sub-Saharan Africa, there are challenges related to tax revenues. The major challenges include; the dependence on the small number of large companies, the weak revenue-raising institutional framework, the non – diversification of the economy which is largely agricultural and lastly, the scarcity of trained human personnel (Moore, 2014). Another significant challenge is the problematic taxation structures in many African countries, for instance, states classified as very low-income economies tend with very limited commercialisation, resulting in competition among different

tax offices to take money from the same taxpayers, failure to share information about taxpayers among tax offices, and high transaction costs to the taxpayers (Moore, 2014).

In contemporary Anglophone Africa, the application of the tax type structures mainly involved the concentration of a scarce resource that is the most competent human resource on the complex affairs of the few larger companies that typically provide the bulk of all tax revenue for African governments. This in turn permits the deployment of staff with weak accounting skills on more routine tasks. This is exemplified by tax revenue officials in Rwanda who mobilize to register and collect fees or business licenses from the numerous drivers of motorcycle taxis (Persson, 2013). In contrast, the tax revenue collection in Latin America takes a divergent view from the situation in Sub-Saharan Africa. The Tax revenue administrators are paying significant attention to bringing more individuals and small businesses into the tax net (Madzivanyika, 2016).

Other main challenges are derived from the trade liberalization policy. There has been a gradual transition towards trade liberalization by many countries and this in effect has a significant impact on a country's tax revenues. The case against the rapid reduction in trade tariffs tends to lead to reduce tax revenues for the state. Importantly, the substitution of export with import taxes creates greater inefficiencies because import taxes are subjected to greater tax dispersion since the latter is subjected to more tax rates than the former. First, the replacement of export taxes was important in improving incentives for exports. Second, the substitution of export taxes with import taxes is essential for maintaining resource mobilization, which was

central to state-building. Third, a dispersion of import taxes allows the state to provide selective rents (and therefore incentives) for the development of particular sectors (Di John, 2016).

Trade liberalization has taken a significant position as many developing and emerging market economies rely heavily on trade taxes as a source of government revenue. In particular, the trade tax in Sub-Saharan Africa accounts for 25% of the total tax revenues, while in Asia and Pacific countries the trade tax account for around 15 per cent of the government tax revenues (Baunsgaard & Keen, 2015). Stotsky, Abgeyegbe and WoldeMariam (2016) examine the effect of trade liberalization on government tax revenues for several countries in Sub-Saharan Africa. The study findings showed that trade liberalization has a significant positive impact on local trade. Liberalization is not strongly linked to aggregate tax revenue or its components-though with one measure, it is linked to higher income tax revenue.

Trade liberalization has a strong positive impact on total tax revenues for high- and middle-income countries. For instance, the study by Baunsgaard and Keen (2015) observed that high-income countries can obtain an equivalent of the total tax revenues while the middle–income countries are able can recover between 45–60 cents of additional domestic tax revenue for each dollar of trade tax revenue. In contrast, low-income countries have on average recovered no more than around 30 cents of each lost dollar.

Trade liberation has two consequences for the government institution. Either the government loses total tax revenues as they are not able to recover lost trade tax thus, they increase non-revenue taxes (Cagé & Gadenne, 2018). Cagé and Gadenne (2017)

sampled developing countries to gauge the fiscal cost of trade liberalization episodes since 1970. The study observed that 40% of the developing countries experience a drop in total tax revenues that lasted for more than ten years in the aftermath of trade liberalization. In general, trade liberalization led to larger and longer-lived declines in tax revenues in developing countries since 1970. Nearly one-third of developing countries have never recovered the lost government expenditures, and poorer countries are more likely to experience an expenditure cost of trade liberalization than rich countries (Cage & Gadenne, 2016).

There are several studies within Kenya on tax revenue and these include Eilu(2018) Maisiba and Atambo (2016) who descriptively examined the impact of the use of electronic tax devices, Omweri *et al.,* (2011) evaluated the effectiveness of the electronic tax devices on the tax revenues in Kisii town to mention a few. These studies only focused on the evaluation of the state of tax revenue in Kenya and the reviews on the use of electronic devices in Kenya as isolated cases (Maisiba and Atambo, 2016; Omweri *et al.,* 2011). Concerning trade liberalization, Esaku(2020), and Owiye, Naibei, and Momanyi (2016) evaluated the effect of trade liberalization on the manufacturing sector, Githanga (2015); Siddiqui (2015) focused on the effect of trade liberalization on the economic development and other economic indices. These studies did not link trade liberalization to tax revenues or measure the impact of trade liberalization on tax revenue in Kenya.

1.2 Statement of the Problem

The increasing dependence on trade taxes in low-income economies presents specific policy challenges. Trade liberalization in these economies has led to reductions in trade taxes, which are the main source of revenue in low-income states. Moreover, alternative tax revenue such as from VAT and income tax have risen significantly less than the decline in trade tax revenue. The overall effect has been a decline in total tax revenues as a percentage of national income in low-income countries. Evidence presented by the IMF shows that low-income country typically recovers only 30 cents per dollar lost to trade tax declines (Di John, 2016).

Trade liberalization is also related to capital flights. Capital flights in developing economies occur within the international financial liberalization policy. Financial liberalization policy facilitates capital flight to onshore and offshore financial centres which are approximately USD 11.5 trillion with an annual global income estimated at USD 860 billion, and the annual worldwide tax revenue lost is approximately US$255 billion (Di John, 2016). Despite the negative effects of trade liberalization on government tax revenues, many more countries are contemplating further liberalization in the form of proliferation of regional agreements, bilateral agreements with the European Union or other developed countries, or concerning prospective multilateral tariff reduction under the Doha round. All these initiatives have a significant impact on government tax revenues (Baunsgaard & Keen, 2015).

Baunsgaard and Keen (2015) indicated that it is possible that trade liberalization in low-income countries has negatively resulted in direct loss of tax revenue but has indirect positive effects from the higher levels of openness and income consequent

upon trade reform that may offset the direct loss of revenue. Empirical studies have shown that developing countries are more likely to bear the effect of trade liberalization policies with a significant drop in tax revenues (Cagé & Gadenne, 2018; Di John, 2016). Due to the conceptual gap in studies detailing the impact of trade liberalization on tax revenues in sub-Saharan Africa, the study seeks to estimate the moderating effect of ICT usage on trade liberalization policies and government tax revenue in Kenya.

1.3 Research Objectives

The main objective of the study was to examine the effect of trade liberalization on government tax revenues in Kenya.

This study was guided by the following research objectives.

I. To assess the effect of trade openness on government tax revenue in Kenya.

II. To establish the impact of international trade on government tax revenue in Kenya.

III. To determine the effect of foreign direct inflows on government tax revenue in Kenya.

IV. a) To evaluate the moderating effect of ICT usage on the relationship between trade openness and government tax revenue in Kenya.

b) To assess the moderating effect of ICT usage on the relationship between international trade and government tax revenue in Kenya.

c) To assess the moderating effect of ICT usage on the relationship between foreign direct inflows and government tax revenue in Kenya.

1.4 Research Hypotheses

H_{01}: Trade openness has no impact on government tax revenue in Kenya

H_{02}: international trade has no impact on government tax revenue in Kenya.

H_{03}: Foreign direct inflows have no effect on government tax revenue in Kenya.

Ho_{4a}: ICT usage does not moderate the relationship between trade openness and government tax revenue in Kenya.

Ho_{4b}: ICT usage does not moderate the relationship between international trade and government tax revenue in Kenya.

Ho_{4c}: ICT usage does not moderate the relationship between foreign direct investments and government tax revenue in Kenya.

1.5 Significance of the Study

The findings of the study are important to the policymakers in the development of the necessary regulations to guide the treasury in drafting the requisite framework guiding the operations of the trade policies. The main reason for the trade liberalization policy has direct implications for fiscal tax revenues. Through the projections, KRA will be able to institute appropriate measures that will augment the country's revenue base.

The study conceptually contributes to policy development by advancing and testing knowledge on trade liberalization in Kenya. The nation's competitiveness levels are based on its trade and since competitiveness is a concern in many studies, the study seeks to understand the national competitiveness and how this component can be used to improve trade liberalization in the development of Kenya.

The findings are also important to foreign investors as it enables them to make commitments based on the stability of policy decisions. This would portend well for these firms as they can make decisions.

The findings add to the existing literature on the subject. It will assist future scholars and researchers to carry out further studies in the area of trade liberalization as it forms a basis for future research.

1.6 Scope of the Study

The study was confined to the effects of trade liberalization and tax revenues in Kenya. The study drew the economic data indicators on tax collections from 1990 to 2022 because of the requirements of methodology. Saunders *et al.*, (2009), consider a sample of 30 data points to be sufficient enough for the regression analysis. The study used both direct and indirect tax revenues as well as total tax collections as collated from the KNBS economic surveys.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This section introduces the study concepts before reviewing empirical literature based on the study variables, the theoretical underpinning of the study, and the conceptual framework of the study.

2.1 Study concepts

2.1.1 Concept of Tax Revenues

Tax revenues are clustered into three categories. Direct taxes cover all forms of taxes levied on earnings, incomes, and profits. This category includes personal income tax, property taxes, inheritance taxes, assessed taxes, land taxes, and corporation taxes. Indirect taxes are, in contrast, levies on incomes and are either customs or domestic market taxes. Domestic market taxes include excise duties and turnover taxes. Customs are levied on international trade. Customs played the dual role of raising revenues and protecting selected industries (Aidt & Jensen, 2015).

Several theoretical approaches inform debates on two main issues concerning increases in tax collection and the efficiency or equity when designing tax systems. These theoretical approaches include the economic approach, the administrative approach, and the political economy approach (Di John, 2016). The economic analysis focuses on the design of tax systems that efficiently and equitably finances the critical level of public spending. This approach divides taxation into a logically-prior positive side and a subsequent normative side on which it introduces value judgments (Esaku, 2020).

This perspective is more applicable in the examination of the economic structure of developing countries. For instance, the economies of developing countries are characterized by a large share of agricultural activities in employment and total output, large informal sectors and occupations; the dominance of small establishments, a small share of wages in total national income, a small share of total consumer spending made in large, modern establishments among other things. It is argued that these characteristics reduce the possibility of depending on certain types of taxes, such as personal income tax, and make them more dependent on indirect taxes such as foreign trade taxes, resulting overall in a lower level of tax collection (Kenny & Winer, 2016).

The administrative approach focuses on the role institutional design and policy play in enhancing the prospects of efficiency and effectiveness of the tax system. Several unfavourable factors commonly identified in developing country tax systems include insufficient staff with appropriate skills, low public-sector wages, lack of equipment and facilities, ill-defined and complex tax and related laws; poor enforcement of penalties for evasion and corruption; poor information collection and identification of taxpayers among others. These administrative constraints constrain the ability of states to collect revenues in general and direct taxes such as income tax in particular (Di John, 2016). The solution to these constraints are policy-related and include, the simplification of the tax rates, increasing the autonomy of the revenue collection agencies and institutionalization of the tax policy that focuses on the implementation of the tax administration (Di John, 2016).

The political economy approach presumes that in weak states, the revenue collection authorities are more effective when they operate autonomously from the state, and as a commercial entity at arm's length from the government rather than as a department within the government (Eilu, 2018). This autonomy protects revenue authorities from political interference and allows directors to circumvent the institutional obstacles of weak public sectors such as cumbersome regulations, low pay, antagonistic unions and so on. As a result, the creation of parallel agencies is favoured over the restructuring of existing tax institutions (Kenny & Winer, 2016).

In general, the political economy approach offers an important complement to the economic and administrative frameworks for understanding taxation. In particular, such an approach, in providing historical and comparative analyses, can contribute to an understanding of why tax capacity differs across countries and changes over time. As importantly, this approach not only integrates economic and political processes but specifically examines the interaction of taxation and state formation.

2.1.2 Concept of Trade Openness

Theoretically, the influence of trade openness and tax revenue performance is considered to be an indirect outcome. This indirect outcome is derived from the response of consumption and production decisions to price changes, which the price changes are triggered by trade reforms. For example, a reduction in import tariffs is likely to influence imports and revenue performance depending on the elasticity of import demand and the price elasticity of supply for import substitutes i.e., if the demand for imports is inelastic it's likely that import volumes and revenue performance will remain unchanged irrespective of the changes in import tariffs and

prices. On the other hand, if the demand for imports is elastic import volumes and revenue performance may increase owing to changes in import tariffs and prices (McIntyre, 2015).

The increasing prominence of trade openness is motivated by four major gains; however, there are considerable overlaps among them. These gains come from unilateral trade openness policies as well as from trade openness policies that take place through regional and multilateral negotiations. The five major gains from trade openness include trade openness allowing countries to export those goods and services that they make efficiently and to import those goods and services that they make inefficiently (Seelkopf, Lierse & Schmitt, 2016). The trade openness results in lower prices, enabling an increase in real income which increases consumer and producer welfare. In the same way, trade openness leads to gains in total factor productivity i.e., freer trade exposes countries to new production technologies that foster higher productivity at both firm and industry levels. Lastly, trade openness enables low-income countries to raise their income levels towards high-income countries (Gnangnon & Brun, 2019).

In the early stages of liberalization, the revenue consequences of reform were relatively minor. Indeed the first steps of trade policy reform—often involving the reduction of prohibitively high tariffs, tariffication of quotas, elimination of exemptions, and raising of low tariff rates in moving towards a more uniform tariff—may plausibly lead to an increase in trade tax revenues (Baunsgaard & Keen, 2015). An economy that has maintained total revenues unchanged following a loss of trade tax revenues, for instance, but may feel a lasting effect of the trade reform in those

revenues being lower than they otherwise would be given the country's level of real income and other characteristics.

2.1.3 Concept of International Trade Tariffs

Import duties are usually ad valorem levies on import value; similarly, taxes on exports are usually ad valorem levies on exports. However, in some cases, these taxes are levied on a specific (or unit) basis or in some more complex form, especially export levies. The effect of trade liberalization on trade tax revenues depends on several factors, including the structure of liberalization. In effect, the replacement of quantitative restrictions with tariffs can raise revenues (Gnangnon & Brun, 2019).

The effect of tariff reductions depends on how the level and coverage of tariffs change. With unchanged import values, a reduction in tariffs reduces revenues from trade taxes and can also be accompanied by reductions in revenues from excises and VATs levied on imports (at least at the importation stage). A change in relative prices would, however, typically induce changes in the level and composition of imports and exports. The revenue outcome thus depends also on the price elasticity of demand for imports and the price elasticity of supply of import substitutes. If imports are sufficiently priced elastic, there may be a revenue gain (Kenny & Winer, 2016).

Since trade liberalization often entails a disproportionate reduction of the highest tariffs, applied to goods that are mainly elastic in demand, the response in terms of higher imports may be sufficient to outweigh the revenue losses from a lower rate of tariff. The elasticity of the supply of import substitutes is also relevant. The lower this elasticity, the smaller the reduction in output for a given reduction in price (of imports

and the domestic good, in a competitive market), and hence the smaller the increase in import values. Since elasticities vary over the range of prices, the starting point for tariff changes is also relevant. If protectionist motives are dominant or the administration is poor, tariffs may be above their revenue-maximizing levels. Export tariffs thus can provide a functional substitute to weak income tax capacity in low-income/post-war economies.

2.1.4 Concept of Foreign Direct Inflows

Foreign direct investment (FDI) is a crucial channel through which capital flows between industrial and developing nations. Its composition also changes remarkably as it takes different forms such as portfolio investment, direct foreign investment (FDI), external commercial borrowings, non-resident deposits and social deposit schemes (Dua & Sen, 2006). Thus, private capital flows (foreign direct investments) act as a source of stability by promoting credit and risk-sharing across borders (O'Connell *et al.,* 2010). FDI flows increase consumption demands for both traded and non-traded goods resulting in the rise in the prices of non-traded goods and the consequent attainment of equilibrium in the market conditions. These increases in the consumption of traded goods lead to a deterioration in the balance of trade without any accompanying changes in the price of traded goods (Al Samara, 2009).

Capital moves in slowly and therefore the target currencies tend to appreciate gradually, thus attracting momentum trading, which in turn fuels further appreciation. Foreign direct capital investment follows the liberalization of the economy and the development of the financial market (Dua & Sen, 2006). FDI directly increase consumption taxes such as VAT and Excise duties. Consumption taxes are mainly

paid by the final consumer which explains the positive relationship between FDI and indirect tax revenue performance.

On the converse, capital flight incurs many economic, political and social costs. Particularly when capital is scarce, capital flight results in a loss of resources to finance investments in infrastructure and social spending. Capital flight also lessens the resources available for investment more generally. This contributes to declines in growth rates which result in growing unemployment, informalisation of economic activity, and poverty. Declining investment also harms the technological upgrading required to keep exports competitive (Drine & Rault, 2008).

In many countries, particularly in sub-Saharan Africa and Latin America, capital flight has been accompanied by increases in foreign borrowing – that is, increased indebtedness has been used, not to finance investment or even consumption, but to finance capital flight itself (Di John, 2016). Capital flight both caused and was caused by lower growth, macroeconomic instability and political instability in Latin America and sub-Saharan Africa. Whatever the mechanisms, capital flight in both regions has severely lowered the tax base and with it, the domestic resources available to finance public investment in infrastructure and social services.

2.2 Theoretical Review

2.2.1 Theory of Public Finance

Public Finance has traditionally been used or applied to policy problems, which involve the use of tax and expenditure measures. It concerns the tax systems, expenditure programs, and budget procedures, stabilization instruments, debt issues,

level of government among other things. As a subject, public finance details the revenue, expenditure and debt operations of the government and the impact of these measures on society (Cheyo, 2015). The theory on public finance largely draws from Musgrave (1959) and relies heavily on the concepts of effective and efficient allocation of resources that are available in the public sector. As per Mirrlees's 1971 framework, there is an optimal nonlinear income tax schedule. The optimal marginal tax rate at each point in the income distribution is set such that the marginal distributional benefits of a higher marginal tax rate are equal to the associated marginal deadweight losses of distorting work effort (Wagner, 2018).

The Mirrlees framework determines how effective marginal tax rates should optimally vary with income. The effective marginal tax rates on labour income include statutory tax rates, as well as the impact of all income-dependent transfers, tax credits, tax deductions, and benefits aimed at redistributing income. The government aims to optimally set the effective marginal tax rate at each level of labour income. Individuals are different in their earning ability, which equals their productivity per hour worked. Individuals trade off the benefits of consumption and the costs of supplying work effort. The government redistributes income from high-a to low-ability individuals. Social preferences for income redistribution are exogenously given (Cheyo, 2015).

The central assumption in public finance is that agents optimize fully with respect to taxes. The theory assumes that the government has full commitment power and thus, the more information is revealed by agents about their types, the stronger the incentive of the government to deviate from the originally promised tax sequences

(Golosov & Tsyvinski, 2015). In a world without distortion, individualized lump-sum taxes would be available as a redistribution of income and to raise revenue. The government would then condition its tax policy on all the characteristics of taxpayers on which it likes to base income redistribution: earning ability, needs, initial endowments, inheritances, luck, and so on. Moreover, if information were perfect, tax avoidance and evasion would not exist (Gupta *et al.*, 2017).

Under optimal commodity taxation agents respond to tax changes in the same way that they respond to price changes. Such that the models of optimal income taxation assume that agents choose labour supply and consumption optimally irrespective of the complexity of the tax schedule they face (Hyman, 2014). In practice, income tax schedules are typically highly non-linear, benefit-tax linkages for social insurance programs are opaque (e.g., social security taxes and benefits), and taxes on commodities vary and are often not directly displayed in posted prices. The theory on public finance is that the government's activities, mostly its revenues and expenditures can be mirrored by a regulation. The view portrays the government as an entity that intervenes in society to alter the equilibrium pattern of market-generated outcomes. Thus, public finance appears as the activity of developing knowledge about the consequences of different interventionist actions by governments (Golosov & Tsyvinski, 2015).

However, tax laws constantly change the opportunities for tax avoidance, but underneath, there remain three basic principles of tax avoidance within an income tax: postponement of taxes where the present discounted value of a postponed tax is much less than that of a tax currently paid. Two, tax arbitrage across individuals facing

different tax brackets where differential tax rates may also induce transactions among individuals in different brackets which substantially reduce the aggregate tax liability and three tax arbitrages across income streams facing different tax treatments where long-term capital gains are taxed at lower rates than are other forms of income from capital (Wagner, 2017).

Information constraints thus determine the opportunities for tax avoidance and evasion and shape the inescapable trade-off between equity and efficiency. First, digitalization can help relax information constraints through better ways to verify the true economic outcomes of taxpayers. Digitalization makes it easier for governments to link existing information in various parts of the tax system to better detect evasion or avoidance (Hyman, 2014).

Digitalization can thus be seen as improving the tax enforcement technology of the government. Better tax enforcement allows governments to raise the same revenue with lower taxes (more efficiency) or to raise more tax revenue with the same taxes. Second, digitalization can allow governments to implement more sophisticated tax systems. By conditioning tax schedules on more information, the government can better target income redistribution. Consequently, the same income redistribution can be achieved with lower tax rates, or the same tax rates can achieve more income redistribution (Gupta, *et al.*, 2017).

Digitalization holds the promise of improving the tax enforcement technology of the government. In particular, digitalization allows the government to process more information on the different economic outcomes of taxpayers, such as their earnings,

capital incomes, consumption expenditures, gifts, and bequests. Information from various sources can thus be used to more easily identify taxpayers who evade taxes (Golosov *et al.,* 2016).

2.2.2 Theory of Comparative Advantage

The trade theory was the first to indicate the importance of specialization in production and division of labour based on the idea of the theory of absolute advantage. Smith (1776) in his famous book: "The Wealth of Nations" published the ideas about absolute advantage which were crucial for the early development of classical thought for international trade. It is generally agreed that David Ricardo is the creator of the classical theory of international trade, even though many concrete ideas about trade existed before his principles. The theory holds that a difference in comparative costs of production is the necessary condition for the existence of international trade. But this difference reflects a difference in the techniques of production(Costinot & Donaldson, 2012).

According to this theory, technological differences between countries determine the international division of labour and consumption and trade patterns. It holds that trade is beneficial to all participating countries. This conclusion is against the viewpoint about trade held by the doctrine of mercantilism where it is argued that the regulation and planning of economic activity are efficient means of fostering the goals of a nation. David Ricardo's theory demonstrates that countries can gain from trade even if one of them is less productive than another in all goods that it produces (Persson, 2013).

In international trade arrangements, optimal tariff arguments are typically cast in simple economies featuring only two goods or quasi-linear preferences. In such environments, optimal trade taxes tend to reduce the problem of a single-good monopolist and leads to the argument that the optimal tariff should be equal to the inverse of the elasticity of the foreign export supply curve (Costinot *et al.*, 2013). The problem of finding optimal trade taxes in the Ricardian model is infinite-dimensional, non-concave and non-smooth since at any wage level, optimal trade taxes must satisfy simple and intuitive properties. Optimal trade taxes tend to be uniform across imported goods and weakly monotone with respect to comparative advantage across goods (Costinot *et al.*, 2015).

These optimal trade taxes include the zero-import tariff accompanied by export taxes that are weakly increasing with comparative advantage or the uniform, positive import tariff accompanied by export subsidies that are weakly decreasing with comparative advantage. While the latter pattern accords well with the countries that tend to protect their least competitive sectors in practice, larger subsidies do not stem from a greater desire to expand production in less competitive sectors. Rather, they reflect tighter constraints on the ability to exploit monopoly power by contracting exports (Costinot & Donaldson, 2012).

2.2.3 Theory of Public Choice

According to the public choice theory, greater political competition may lead to moderate policy choice in terms of taxation (Buchanan & Wagner, 1977). The theory assumes that politicians differ according to their quality and they have to attract the vote of two types of groups: low-skilled individuals (the majority) and high-skilled

individuals. When there is no quality difference, to maximize the number of voters, the politicians will reduce or not increase taxes that affect the majority, made up of low-skilled individuals (Prichard *et al.*, 2014). Political competition plays an important role in the increase and stability of tax revenues. In this line, political parties, by providing the political support necessary to legitimate state tax policies, help to put the tax system on the right track (Yogo & Ngo Njib, 2018).

When the quality difference is large, advantaged politicians have a higher probability of getting elected. Therefore, the politician will adopt a moderate tax policy to avoid losing the vote of the majority while preserving the interests of high-skilled individuals. This could mean no reduction of indirect taxes, but also no increase in income taxes or property taxes. Finally, in the case of a small difference in quality, the advantaged politicians will still maintain a moderate tax policy, but give more weight to the majority of low-skilled voters. This could mean reducing indirect taxes while maintaining the level of income or property taxes. The disadvantaged politician in contrast will follow an extreme policy to attract all the votes of the majority (Yogo & Ngo Njib, 2018).

In a redistributive state of the world, political control implies tax distortion in the sense that one group is always overtaxed to fund the redistribution. Therefore, the government may choose to reduce indirect taxes but to increase direct taxes. This is consistent with the vote-maximizing assumption because the government wants to gain the support of the largest part of the population, which is made up of low-skilled and poor people who are most affected by the indirect taxes (VAT) because of the informality of their sector. The reduction of VAT will lead to more consumption and,

therefore, more tax revenues. The increase of direct taxes (income taxes) could lead to a potentially similar effect because the loss in income will shift the household's behaviour from investment or saving to more consumption (Persson, 2013).

Politicians are vote-maximizers and will choose the tax policy that maximizes the well-being of a large group of voters. Likewise, political competition can help to provide the necessary political support to legitimate state tax policies and improve voluntary compliance among taxpayers. This will result in more tax collection and less volatility of tax revenues. According to Rogers and Rogers (2000), greater political competition leads to a bigger government in terms of public spending. Therefore, when the political competition is greater, the government, which is vote-maximizing, tends to tax more to finance the provision of public goods that will improve the well-being of the voters, especially when it faces a budget deficit constraint, which reduces the possibility of resorting to debt. This argument suggests that improvement in the delivery of public services will increase the legitimacy of the state collecting taxes, and therefore, generate greater compliance among taxpayers.

Yogo & Ngo Njib (2018) examined the impact of political competition on tax revenues in developing countries. The study findings showed that political competition significantly and positively affects total tax revenues. However, this general pattern slightly differs across the type of taxes; and the net effect of political competition on tax revenues is negative for countries that have adopted fiscal rules. Political competition positively and significantly affects total tax revenues. Yogo and Ngo Njib (2018) observed that total tax revenues are higher in countries with high political competition, in contrast, trade taxes seem to be lower in countries with high political competition.

Person (2013) explained the fact that more political competition induces more political legitimacy and increases the consent of citizens to pay taxes. In the context of high political competition, governments face higher pressure from the population to extend social benefits to workers and increase the provision of public services. The observed positive effect of political competition may also reflect a political attitude of aiming to attract the votes of the majority. In fact, in the short run, the government has to build on the state's fiscal capacity, such as improving the competencies of tax administration, capacity building etc., therefore, the government is inclined to tax more in the short run and/or provide less public goods.

The competition between political parties for support from heterogeneous voters forces the government to choose a tax structure based on the loss in support —or, political costs—associated with different tax sources. These political costs depend on losses in full income including excess burdens, on administration and enforcement costs, which represent a wedge between revenues collected and public services provided, and on how these factors are translated into political opposition (Kenny & Winner, 2016).

The competing politicians may differ in competencies and therefore political failures are avoided if politicians maximize winning probabilities. If politicians engage in vote-share maximization, the less competent politician's policy proposals are attractive to the minority of rich agents, whereas those of the competent politicians are attractive to the majority of poor agents. The less competent politician wins with a positive probability, which gives rise to political failure (Bierbrauer & Boyer, 2013).

2.2.4 Technological Acceptance Model

The Technology Acceptance Model (TAM) is considered the most influential and commonly employed theory for describing an individual's acceptance of information systems. Although many models have been proposed to explain and predict the use of a system, the Technology Acceptance Model has been the only one which has captured the most attention of the Information Systems community. Thus, it is essential for anyone willing to study user acceptance of technology to have an understanding of the Technology Acceptance Model (Chuttur, 2009).

Davis (1989) proposed the technology acceptance model (TAM) to explain the potential user's behavioural intention to use technological innovation. TAM is based on the theory of reasoned action (TRA), a psychological theory that seeks to explain behaviour. TAM involved two primary predictors— perceived ease of use (EU) and perceived usefulness (U) and the dependent variable behavioural intention (BI), which TRA assumed to be closely linked to actual behaviour. TAM has come to be one of the most widely used models in IS, in part because of its understand ability and simplicity. However, it is imperfect, and all TAM relationships are not borne out in all studies; there is wide variation in the predicted effects in various studies with different types of users and systems (King & He, 2006).

TAM was developed to predict individual adoption and use of new ITs. It posits that an individual's behavioural intention to adopt a system is determined by two beliefs: perceived usefulness and perceived ease of use (Venkatesh & Davis, 2000). In this context, the complex multi-faceted ICT refers to an important productivity tool as well as a source of new knowledge. However, it is important to underline, on one

hand, the close relationship between the average level of education and the training of the population, and, on the other hand, the dissemination of new technologies. These two types of investment in advanced training programs and new technologies are at least partially linked (Ondraczek, 2013).

TAM is originally a theoretical model of an information system used to determine the level of acceptance and use of new technologies by users. Acceptance has been viewed as a function of user participation in systems development. Perceived usefulness (PU) and Perceived ease of use (PEU) [are the two cognitive beliefs in TAM (Malik & Ayop, 2020). PU is the stage where a person trusts certain technologies that will improve their work performance. External variables are defined as variables that affect PU, PEU, and attitude towards using new technology (Guta, 2020).

2.4 Trade Openness and government tax revenues

Gnangnon (2019) examined the impact of trade openness on the tax revenue performance of developing countries. The study employed a panel data approach on 95 developing countries and used progressive tax replacements. The findings indicated that trade openness is positively associated with tax revenue such that countries that further open up their economies to international trade tend to enjoy a higher tax revenue than countries that are experiencing a lower degree of trade openness. Shrestha, Kotani and Kakinaka (2021) used a panel data analysis on 13 countries to examine the impact of trade openness on tax revenue. The study applied the ARDL technique and the findings show there is a negative long-term association between trade openness and tax revenue for resource-rich economies.

Loganathan, Ahmad and Subramaniam (2020) explored the effects of trade openness on tax revenue in Malaysia using the ARDL model. The findings indicate that a short–run relationship exists between tax revenue and trade openness but importantly, trade openness has no significant causality impact on tax revenue. Khattry and Rao (2015) examined the impact of trade openness on tax revenue performance. The study used a panel of 80 developing and industrialized countries and employed fixed effects regression. The findings indicated that trade openness leads to a decrease in direct and trade revenues. Further, the study noted that the structural characteristic of low-income and developing countries are significant in explaining the decline in revenue performance.

Baunsgaard and Keen (2015) examined the impact of trade openness as a measure of trade liberalization on government total tax revenues. The study used a comparative approach to examine the effect of exports and imports resulting from international trade. The study findings showed that openness is significantly positively related to domestic tax revenue. Trade openness has a significant negative effect on domestic tax revenues, but interaction terms indicate a positive effect that increases with the level of national income and a negative that increases with openness. The interaction term between the VAT dummy and trade tax revenues was positive and significant and this indicated that countries with a VAT recover less revenue than those without. In total, trade taxes recover 24 cents for each dollar of lost total taxes at an average delay of around 2.5 years.

In a cross-country panel study, Gaalya, Edward and Eria (2017) examined the effect of trade openness on tax revenue performance in East African Community countries

using the panel data cointegration technique. The study used average trade tariffs to measure trade openness. The study findings showed that the average tariff rate positively influences total tax, indirect tax and trade tax, however, trade openness had an insignificant relationship with direct taxes. The findings showed that an increase in tariff rates beyond a certain rate would result in a decrease in revenue for the three tax categories.

Gupta (2017) used panel data on developing countries to conclude that structural factors such as trade openness and foreign aid significantly increase revenue performance in developing countries. The study shows that trade openness has a strong positive relationship with total revenue performance. In Nigeria, Egwakhe, Akinlabi and Odunsi (2018) examined the relationship between trade openness and tax revenue. The study estimates the impact of the trade openness using regression analysis and the findings showed that trade openness has a significant negative effect on the tax revenue performance.

2.5 International Trade and government tax revenues

Arezki, Dama and Rota-Graziosi (2021) examined the dynamic effect of trade liberalization tax revenue using a combination of tax revenue data from the Government Revenue Dataset (GRD) of the ICTD. The results indicated that trade liberalization has a short–term negative effect on tax revenue but with no significant effect in the medium term. Further, liberalization changes the tax structure from direct taxes to indirect taxes away from direct ones with economies being able to mitigate against the negative effects on tax revenues through the implementation of value-added taxes.

Gnangnon and Brun (2019) investigated the effects of tax reforms where there is a progressive replacement of trade tax revenue with domestic tax revenue. The study used the GMM approach to analyse the impact of tax reformation among developing countries. The study findings indicated that tax reform is positively associated with tax revenue performance, with the magnitude of the effect increasing as countries experience a higher development level. Additionally, countries that further open up their economies to international trade enjoy a higher positive effect of tax reform on tax revenue than countries that experience a lower degree of trade openness.

Moller (2016) investigated the impact of trade liberalization among 35 low–income countries on tax revenue using trade tarrifs. The study used panel regression analysis and the study findings indicated that trade tariffs have long – run positive association with tax revenue performance such that for each dollar lost in trade taxation, countries regain approximately 45 cents from other tax bases in the long run.

Baunsgaard and Keen (2015) examined the impact of international trade on a country's total tax revenue relative to GDP. The study was comparative and was carried out in several developed and developing countries. The findings showed that experience with international trade varied with the country's classification. For high-income counties, Trade tariffs led to a slight reduction in trade tax revenues but with a sustained increase in total tax revenues. For middle-income countries, the total tax revenues have increased on average, despite a slight reduction in trade tax revenues, while for low-income countries, the international trade resulted in a steady reduction in trade tax revenues that was accompanied by a trend reduction in total revenues.

Hisali (2012) examined the relationship between tariff reform and trade taxes in Uganda. The findings showed that tariffs impact trade taxes and the pass-through effects of the exchange rate fluctuations to the domestic market price of imports and this increases trade taxes in the short run but reduces trade taxes in the long run. This study predicts that trade openness to some extent decreases revenue performance. In Uganda, Gaalya (2015) used fixed and random effects models to estimate the effects of trade openness on tax revenue performance. The findings indicated that trade openness has a positive influence on tax revenue performance. This indicated that the average tariff rate as a measure of trade openness has a negative relationship with indirect tax revenue performance.

In a cross-sectional study on 30 African countries over the 1996-2016 period, Epaphra & Massawe (2017) analysed the effects of several institutional, structural and policy factors on total tax revenues, direct taxes, indirect taxes and trade taxes using panel data set. The study used the fixed effects model and the empirical results show that tariff rates tend to have a strong negative effect on total tax revenue but at the same time they have a strong positive effect on trade tax revenue. The reduction in tariffs tends to offset the increase in the ratio of imports and exports to GDP. Shinyekwa and Othieno (2016) examined the impact of trade openness on the tax revenues of Uganda using the WITS-SMART simulation model. The study findings indicated that the effective elimination of non-tariff barriers to trade had a significant effect on tax revenues. The decline in the average tariff rate led to an increase in trade thus increasing the indirect taxes with a compound effect of reducing the direct taxes.

2.6 Foreign Direct Inflows and government tax revenues

In a study carried out in European Union, Gasparėnienė *et al.*, (2022) examined the impact of foreign direct investments on tax revenue in the European Union economy. The study used data from the United Nations Conference for Trade and Development (UNCTAD) database and the World Development Indicators database (WDI) of the World Bank and analyzed the data with the aid of panel data analysis, and multiple regression analysis. The findings indicated that FDI has a statistically significant lagging impact on the tax revenue of the EU member states. Whereas inward FDI has a dampening effect on tax revenue, outward FDI has a significant stimulating impact on total tax revenue.

Bayar and Ozturk, (2018) investigated the impact of foreign direct investment inflows on tax revenues in OECD countries using error–correction models. The study analyzed the relationship between foreign direct investment inflows and total tax revenues in 33 OECD countries. The findings showed that foreign direct inflows have a one-way causality with tax revenue with a positive effect in Iceland, Israel, Sweden, the United Kingdom, and the United States, and a negative effect in Austria, France, Italy, and Poland. Bunescu & Comaniciu (2014) examined the relationship between several macroeconomic variables, causal factors and tax revenues in 27 EU member countries. The study used Pearson correlation and grouped the factors into most significant, less significant and non-factors. The study observed that foreign direct investment was a less-significant factor and showed a weaker association with tax revenues.

In a cross-country study, Andrejovska and Pulikova (2018), examined the impact of foreign direct investment on tax revenues in 28 EU member states. The study used several regression models to estimate the differential effects of these variables and the findings showed that foreign direct investments had a positive effect on tax revenues. In the Eurozone economies, Odabas (2016) investigated the impact of FDI inflows on the tax revenues in the selected transition economies of the European Union including Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia and Slovenia. The study findings showed that FDI net inflows have a lagged direct effect on the tax revenues of these economies.

In Pakistan, Mahmood and Chaudhar (2013) evaluated the impact of foreign direct investment on tax revenue in Pakistan. The study applied the Auto-Regressive Distributive Lag to examine the long – and short-run effects of these relationships. The study observed that foreign direct investment has a positive and significant impact on tax revenue. Okey (2013) examined the impacts of foreign direct investment (FDI) on tax revenues for eight West African countries. The study used Auto-Regressive Distributive Lag and the findings showed that FDI has a significant positive effect on tax revenues, especially tax on direct taxes and total tax revenues. Further, the study observed that FDI has a negative deleterious effect on direct and indirect taxes for the industrial and mining sectors

2.7 Information Technology and government tax revenues

In a paper examining tax administration in low–income countries, Okunogbe and Santoro (2022) evaluated the effect of the use of information technology by tax authorities. The study observed that the technological robustness encourages in-

person interactions and improves the interfacing with electronic systems thus consistently improving the taxpayer experience. First, the use of technology, in the integrated tax administration systems streamlines the taxpayer registration process and helps improve taxpayers' experience by making it easy for them to obtain information and fulfil their tax obligations. These processes improve tax compliance among the taxpayers thus increasing the tax revenue collections. For instance, In Liberia, Okunogbe (2013) evaluated the use of low-cost technology investment in creating a new property database. The study used descriptive studies to determine the taxable properties and allowed the Liberia Revenue Authority to create a significant property tax database. The study observed that the tax authorities were able to triple the property registration and tax payment rate among property owners.

In Peru, Bellon *et al.,* (2019) evaluated the impact of e-invoicing on firm tax compliance and performance using administrative tax data. The study observed that e-invoicing increases reported firm sales, purchases and value-added by over 5 per cent in the first year after adoption. The impact is concentrated among smaller firms and sectors with higher rates of non-compliance, suggesting that e-invoicing enhances compliance by lowering compliance costs and strengthening deterrence. Olushola (2015) evaluated the impact of the use of ICT on the collection of company income tax in Nigeria using a mixed-method approach and adopted a correlational analysis. The study reported that the use of ICT increased the level of effectiveness of revenue collection realized from company income tax collection.

In a study carried out on large manufacturing firms, Fan *et al.,* (2018) examined the effect of the enforced adoption of new technology on VAT payments. The study was

descriptive and observed that the enforced usage of ICT in VAT collections increased VAT payments made by large manufacturing firms in China from 12.9% to 27.1% of VAT revenues of total government revenues in the five years. In a study carried out in Nigeria, Olatunji and Ayodele, (2017) examined the impact of the use of information technology on tax administration in Nigeria. The study tested the effect of information technology on tax planning and productivity using multiple regression. The findings indicated that the use of information technology as measured by Online Tax Registration, Filing, and Remittance has a significant effect on the tax administration. This effect indicates that the use of information technology has an indirect effect on the collected tax revenues by simplifying and improving the transparency of tax collections.

2.8 Research Gaps

The studies linking trade openness on tax revenue have examined the impact of trade openness in both developing countries (Gnangnon, 2019; Loganathan, Ahmad & Subramaniam; 2020; Gaalya, Edward & Eria, 2017; Gupta, 2017; Egwakhe, Akinlabi and Odunsi, 2018) and developed countries (Khattry & Rao 2015). The finding showed that trade openness has a positive effect (Gnangnon, 2019; Gaalya, Edward & Eria, 2017; Baunsgaard & Keen, 2015; Gupta, 2017) and negative effect (Shrestha, Kotani and Kakinaka, 2021; Khattry and Rao, 2015) and no effect (Loganathan, Ahmad and Subramaniam, 2020; Egwakhe, Akinlabi and Oduns, 2018). The studies have used several methodologies that included panel regression models, ARDL and cointegration technique. The studies in sub-Saharan Africa in East African Countries (Gaalya, Edward & Eria, 2017) and Nigeria (Egwakhe, Akinlabi and Odunsi, 2018)

have reported the impact of trade openness. Due to the divergence in the findings, this study examines the impact of trade openness on tax revenue.

The studies illustrating the impact of trade liberalization on tax revenues are many starting from those done in developed economies (Arezki, Dama & Rota-Graziosi, 2021; Hisali, 2012)) and developed economies (Gnangnon and Brun, 2019). The studies used varied methodologies and the findings are dissimilar to Gnangnon and Brun (2019); Hisali (2012); Epaphra & Massawe (2017); Shinyekwa &. Othieno (2016); Moller (2016) and Gaalya (2015) reported negative impacts while Arezki, Dama and Rota-Graziosi (2021). The studies in the sub-saharan context have been mainly done in Uganda (Gaalya, 2015; Hisali, 2012; Shinyekwa &. Othieno, 2016). Due to the divergence in the findings, this study examines the impact of trade openness on tax revenue in Kenya.

The studies examining the impact of foreign direct inflows have been largely done in EU countries (Gasparėnienė *et al.,* 2022; Bayar and Ozturk, 2018; Bunescu & Comaniciu. 2014; Andrejovska & Pulikova, 2018; Odabas, 2016) with Mahmood and Chaudhar (2013) and Okey (2013) focussing on developed economies. The studies have varied methodologies and dissimilar findings with Gasparėnienė *et al.*, (2022); Bayar and Ozturk, (2018) and Odabas (2016) reporting of lagged effect and causality, while Andrejovska and Pulikova (2018); Mahmood and Chaudhar (2013) and Okey (2013) observing a direct effect. Due to the dearth of studies in the East Africa context, this study examines the impact of inward FDI on tax revenue in Kenya.

2.9 Conceptual Framework

A conceptual framework is the diagrammatic presentation of the relationship between the variables as shown in Figure 2.1. In this study, the independent variables were; exports value, imports value, GDP values, taxes and tarrifs on imports, non-revenue tax revenues in Kenya.

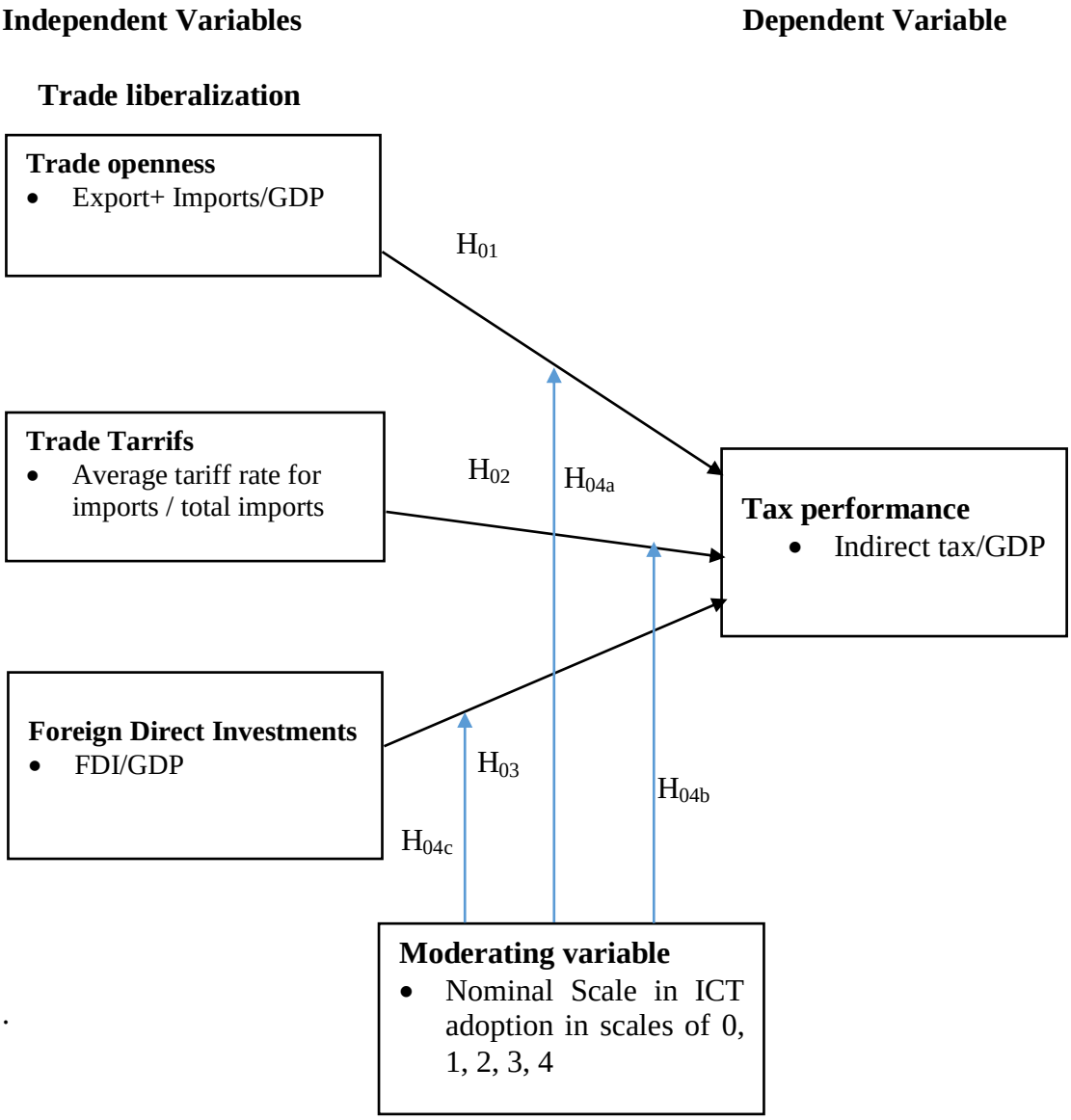


Figure 1.1: Conceptual Framework
Source: Researcher (2022)

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents the methods of data collection and analysis. The chapter is composed of the research design, study population, sampling design, data collection, validity, reliability, data analysis and ethical considerations.

3.1 Research Design

The study employed an explanatory research design as it sought to establish causal relationships between variables by emphasizing studying a situation to explain the relationships between variables (Saunders, Lewis & Thornhill, 2009). Explanatory design is used to examine causal relationships between the variables and provide the reasons for the phenomenon being observed. The study used explanatory design to examine the relationship between the moderating influence of information communication technology, and the impact of trade liberalization on government tax revenue in Kenya.

3.2 Target Population

The study targeted tax–revenue collection data from 1990 to 2022 in the form of direct and indirect taxes, tax and non-tax revenues, gross domestic product figures, customs duty on imports and exports, imports and exports, and amount of foreign direct investments. According to Saunders *et al.,* (2009), the use of regression analysis requires a minimum of 30 data points and as such the study collected data from the year 1990 to 2021 in order to cater for the requirements of the regression analysis.

3.3 Description of Sample Period

The study used secondary data from 1990 to 2022 because of the consistency of the information on tax revenues. Further, the tax revenue collections were streamlined from 1990 and thus the data was consistent.

3.4 Data Types and Sources

The study used secondary data sources which were primarily drawn from the organization's databases, communication and/or websites and reports. These can be important raw data sources in their own right, as well as a storage medium for compiled data (Saunders *et al.,* 2009).

3.5 Data Collection

The study used data from the Kenya National Bureau of Statistics (KNBS), UN Comtrade statistics and the Central Bank of Kenya as the main data sources of information from 1990 to 2021 which span over 30 – year period. The data to be collected included data on imports, exports, foreign direct investments, government tax revenue and GDP figures from 2000 to 2022.

Table 3.1: Data Sources

Variable	Values	Data source
Gross domestic product	Figures in Kshs	KNBS/CBK
Taxes	Figures in Kshs	KNBS/CBK
Foreign Direct Inflows	Figures in Kshs	Comtrade/CBK
Exports	Figures in Kshs	KNBS/CBK
Imports	Figures in Kshs	KNBS/CBK
Trade taxes	Figures in Kshs	KNBS/CBK

3.6 Model Specification

3.6.1 Direct Effects Model

Since the study took the form of panel data format, the overall direct model equation took the form of

$$\text{Tax ratio}_{it} = \beta_0 + \beta_1 \text{Openness}_{it} + \beta_2 \text{Tarrifs}_{it} + \beta_3 \text{FDI}_{it} + \varepsilon_{it}.$$

3.6.2 Moderated Effects Model

The moderator variable affects the strength and/or direction of the relation between a predictor and an outcome by either enhancing, reducing, or changing the influence of the predictor (Fairchild & Mackinnon, 2009). The study used moderated model with the moderator M of the effect of X and Y as shown in Figure 3.1 below.

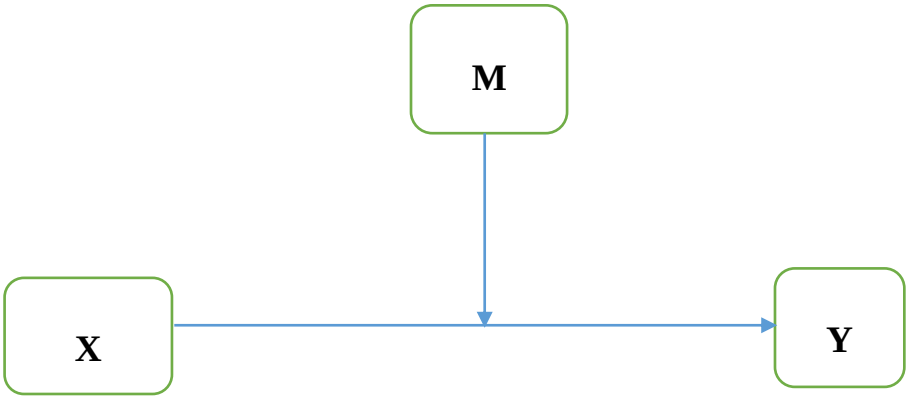


Figure 3.1: Moderated effects model

Source: Fairchild & Mackinnon, (2009)

The use of moderated effects model of ICT is based on the fact that ICT adoption and usage is an enabler in a business environment and therefore its effects can only be considered to be indirect and tend to intermediate the taxpayers with taxing agencies

and at the same time simplify tax paying processes while improving the volume of taxes paid.

The effect of moderation is typically viewed as an interaction between factors or variables, where the effects of one variable depend on levels of the other variable in the analysis as informed in the equation below.

$$\text{Tax ratio}_{it} = \beta_0 + \beta_1 \text{Openness}_{it} + \beta_2 \text{Tarrifs}_{it} + \beta_3 \text{FDI}_{it} + \beta_4 \text{ICT Adoption}_{it} + \beta_5 \text{Openness}_{it}\text{*ICT adoption} + \beta_6 \text{Tarrifs}_{it}\text{*ICT Adoption} + \beta_7 \text{FDI}_{it}\text{*ICT Adoption} + \varepsilon_{it}.$$

As the indirect effect is the statistical quantification of the mechanism through which X affects Y, when it is a linear function of a moderator, it means the strength increases or decreases with changes in the moderator. The inclusion of Z and XZ in the model of Y would allow the direct effect of X to be moderated by Z, though that would not change the function defining the indirect effect of X (Fairchild & Mackinnon, 2009).

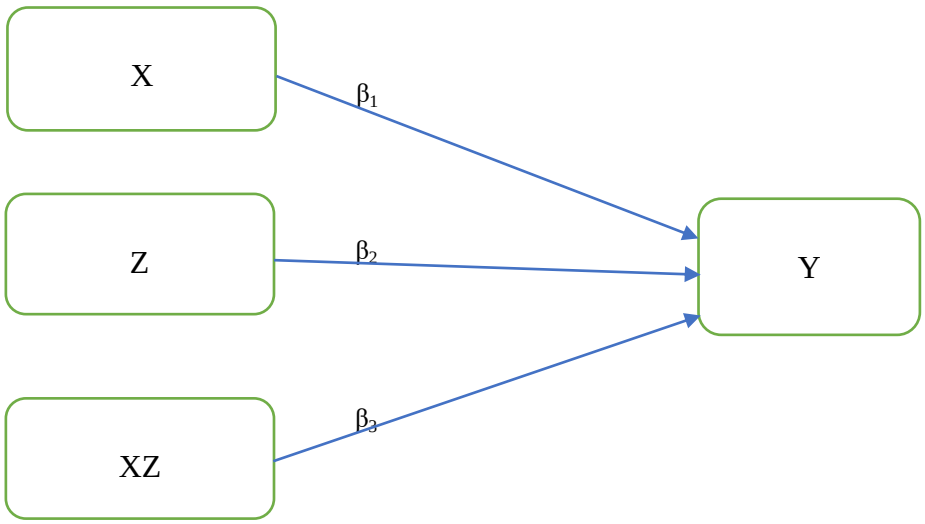


Figure 3.2: Moderation effects
Source: Fairchild & Mackinnon, (2009)

Where X = the independent variable, Y = the dependent variable, Z= the moderator variable, XZ = the product of X and the moderator variable, β_1 = the effect of X on Y, β_2 = the effect of Z on Y, and β_3 = the effect of XZ on Y

3.7 Measurement of the Variables

The data on GDP, Taxes, Exports, imports and Trade taxes were obtained from two primary public sources tasked with the management of government proprietary data. These organizations, Kenya National Bureau of Statistics and Central Bank of Kenya keep proprietary data on all social and economic data in the country which are published on their websites. The data on foreign direct investments are obtained from UN Comtrade which is a United Nations Body tasked with the management of trade statistics between countries.

0 represents the manual based system of filling taxes, 1 represents the basic automation of ICT devices in organizational functions, 2 represents advanced adoption of ICT devices in processing of taxes, 3 represents integration of ICT with the taxpayer, and 4 represents the pervasive and integrative usage of ICT devices with taxpayers' systems.

Table 3.2: Measurement of variables

Variable	Measurement	Source
Tax ratio	$\frac{\text{Indirect taxes}}{\text{GDP}}$	World Development Indicators (2017)
Trade openness	$\frac{\text{Export} + \text{Imports}}{\text{GDP}}$	World Development Indicators (2017)
FDI	$\frac{\text{FDI}}{\text{GDP}}$	World Development Indicators (2017)
Trade tariffs	$\frac{\text{Trade Tarriff}}{\text{Imports}}$	World Development Indicators (2017)
ICT usage	Levels of ICT adoption on a nominal scale 0: Manual based (No ICT devices) 1: Basic usage of ICT devices, 2: Advanced usage of ICT devices, 3: Organizationwide ICT Integration 4: Pervasive and integrated ICT systems	Sirirak *et al.*, (2011).

3.8 Data Analysis

Data preparation was carried out in several significant steps which include data editing, coding and entry which convert the raw form to reduced and classified forms that are more appropriate for analysis (Cooper and Schindler, 2014).

3.8.1 Descriptive Analysis

Descriptive analysis is the elementary transformation of data in a way that describes the basic characteristics such as central tendency, distribution, and variability. Data will be analysed through the use of measures of central tendencies such as means, and measures of dispersion such as skewness, and standard deviation statistics (Zikmund *et al.,* 2010; Depoy and Gitlin 2011). Once the descriptive analysis has been done, the information was presented in various ways such as pictorial and tabular formats. Once descriptive statistics is complete, the data was analysed inferentially through panel regression analysts

3.8.2 Diagnostic Tests

The study carried out a set of assumptions about how a data set was produced by an underlying data-generating process in the classical linear regression model. Since the state of the relationship was deterministic, the study used the following test; unit root testing, autocorrelation, normality, heteroskedasticity and specification tests.

3.8.2.1 Normality

The normality assumption also plays a crucial role in the validity of inference procedures, specification tests, and forecasting. In the panel-data analysis, the use of skewness and excess kurtosis in each component separately or jointly can be seen as

extending the famous Jarque–Bera tests for simple panel-data models. The skewness and kurtosis of the error components in linear panel-data random-effects models allow one to evaluate each error component's third and fourth moments. This can be used as an alternative to the Jarque–Bera test in panel-data models (Alejo *et al.,* 2015).

3.8.2.2 Unit Root Test

The null hypothesis is that the series contains a unit root, and the alternative is that the series is stationary. The stationarity of the values in a series was examined through Levin Li Chu (LLC) and Breitung unit root testing which are more appropriate for pool panel data. The LLC and Breitung approaches are that evidence against the non-stationary in one series is required before the joint null is rejected (Alejo *et al.,* 2015)..

3.8.2.3 Homoscedasticity

The test for homoscedasticity is carried out to determine whether the variables display constant variance and is best examined graphically or through the use of the Breusch-Pagan-Godfrey test (Hair *et al.,* 2010). If heteroscedasticity is a result of non-normality in one of the variables, the remedy is the use of weighted least squares regression in a linear regression context (Hair *et al.,* 2019).

3.8.2.4 Autocorrelation

Heteroskedasticity, cross-sectional and serial correlations pose significant problems in the error terms of panel regression models. The second approach is the use of the feasible GLS (FGLS) estimator is more efficient than the ordinary least squares (OLS) in the presence of heteroskedasticity, serial and cross-sectional correlations as it takes into account, heteroskedasticity, and cross-sectional and serial correlations in the

estimation and clustering problems in fixed effects panel and multilevel models. Empirical evidence supports the use of FGLS estimation in solving the heteroscedasticity and autocorrelation in the data (Khaoula & Moez, 2019).

3.8.2.5 Multicollinearity

High collinearity or multicollinearity is signalled when inter-correlation among the independents is above 0.9 (Hair *et al.,* 2010) or when high R-squared and significant F tests of the model occur in combination with non-significant t-tests and they affect the efficiency of regression estimates by inflating standard errors and impacting on the reliability of the estimates (Garson, 2013). Collinearity is detected when the variance inflation factor (VIF) ≥ 10 or a tolerance figure, $T \geq 0.4$ (Sekaran & Bougie, 2010). In such cases, the variable in question is dropped from the analysis (Sekaran & Bougie, 2010; Saunders *et al.,* 2009).

3.8.2.6 Hausman Test

OLS with pooled cross-sectional and time-series specification assumes that all the variables have the same behaviour with respect to the explanatory variables. Two assessment techniques that are often used in the GLS method for panel data analysis are the fixed effects model and the random effects model.

The hypothesis usually considered in the Hausman test is:

H_0: Random-effects model is appropriate

H_1: Fixed effects model is appropriate

A test of significance indicates that the null hypothesis is rejected indicating that the fixed effects can be considered to be appropriate.

3.8.3 Inferential Analysis

The study carried out panel regression analysis as the data encompassed both observations of cross-sectional and time-series data over the period. Panel regression models combine cross-sectional data and time-series data where the same unit cross-section data is measured at different times (Brooks, 2014).

Table 3.3: Hypothesis Testing

Hypothesis	**Statistical model**	**Hypothesis tests**	**Interpretations**
Trade openness has no impact on government tax revenue in Kenya	$\mathbf{Y_t = \beta_{0t} + \beta_{1t}X_{1t} + \varepsilon_t}$	$\mathbf{H_{01}: \beta_1 = 0}$	Reject H_{01} when $\beta_1 \neq 0$, $p \leq 0.05$, otherwise fail to reject if $p > 0.05$.
International trade has no impact on government tax revenue in Kenya.	$\mathbf{Y_t = \beta_{0t} + \beta_{2t}X_{2t} + \varepsilon_t}$	$\mathbf{H_{02}: \beta_2 = 0}$	Reject H_{02} when, $\beta_2 \neq 0$, $p \leq 0.05$, otherwise fail to reject if $p > 0.05$.
Foreign direct inflows have no effect on government tax revenue in Kenya.	$\mathbf{Y_t = \beta_{0t} + \beta_{3t}X_{3t} + \varepsilon_t}$	$\mathbf{H_{03}: \beta_3 = 0}$	Reject H_{03} when $\beta_3 \neq 0$, if $p \leq 0.05$, otherwise fail to reject if $p > 0.05$.
ICT usage does not moderate the relationship between trade openness and government tax revenue in Kenya.	$\mathbf{Y_t = \beta_{0t} + \beta_{4at}X_{4at} + \varepsilon_t}$	$\mathbf{H_{04a}: \beta_{4a} = 0}$	Reject H_{04a} when $\beta_{4a} \neq 0$, $p \leq 0.05$, otherwise fail to reject if $p > 0.05$.
ICT usage does not moderate the relationship between international trade and government tax revenue in Kenya.	$\mathbf{Y_t = \beta_{0t} + \beta_{4bt}X_{4bt} + \varepsilon_t}$	$\mathbf{H_{04b}: \beta_{4b} = 0}$	Reject H_{04b} when $\beta_{4c} \neq 0$, $p \leq 0.05$, otherwise fail to reject if $p > 0.05$.
ICT usage does not moderate the relationship between foreign direct investments and government tax revenue in Kenya.	$\mathbf{Y_t = \beta_{0t} + \beta_{4ct}X_{4ct} + \varepsilon_t}$	$\mathbf{H_{04c}: \beta_{4c} = 0}$	Reject H_{04c} when $\beta_{4c} \neq 0$, $p \leq 0.05$, otherwise fail to reject if $p > 0.05$.

3.9 Ethical Considerations

The study considered the major ethical considerations that include accessibility and reliability of the secondary data. The researcher obtained permission from the School of Business and Economics, Moi University to conduct and then acquired a research permit from the National Commission for Science, Technology and Innovation.

CHAPTER FOUR: DATA PRESENTATION, INTERPRETATION AND DISCUSSION

4.0 Introduction

This chapter presents the research findings, hypothesis testing and discussion of the findings. The section begins with the description and the presentation of the descriptive statistics of the study variables and inferential statistics respectively. Accordingly, hypotheses testing was done and the explanations of the findings were subsequently presented. Ultimately, the conclusion of the hypotheses was supported by a discussion.

4.1 Trends in government revenues, taxes and other Variables

For ease of interpretation, the tax-related terms as defined as follows;

Direct taxes comprise the taxes **o**n income (income tax), profits (corporate tax) and capital gains.

Indirect taxes are made of Value Added Tax, excise tax, property tax, Customs duties, other taxes on international trade and transactions, taxes on the use of goods and on permission to use the goods or to perform services and activities and taxes on goods and services collected as Appropriation in Aid.

Tax revenues are government levies on direct and indirect consumption and comprise both direct taxes (direct consumption) and indirect taxes (indirect consumption).

Non–tax revenues are government levies that are not related to any consumption activity by any entity (person or corporation) and comprise social security contributions, Property income, sale of goods and services, Fines penalties and

forfeitures, Ministerial Appropriation in Aid, Repayments from domestic lending and on-lending and other receipts not elsewhere classified.

4.1.1 Descriptive Statistics

Table 4.1: Descriptive Analysis

Variable	Mean	Standard Deviation	Maximum	Minimum
Tax ratio	12.9440	4.0541	20.2028	7.3120
Trade openness	45.7025	12.3859	64.0674	21.3443
Trade Tarrifs	9.7533	3.2280	16.1611	5.1255
FDI	1.9650	2.5422	11.8396	0.0541

The statistics in Table 4.1 concerns the descriptive statistics of the study variables. The average tax ratio was 12.9440 (SD = 4.0541), with a maximum of 20.2028 and a minimum of 7.3120. The indications are that indirect taxes make up an average of 13 per cent of the Gross Domestic Product. The statistics show that trade openness as the ratio of external trade to GDP averaged 45.7025(SD = 12.3859) a maximum of 64.0674 and a minimum of 21.3443. This indicates external trade comprises a significant component of GDP and has positive impacts on the GDP. The statistics show that trade openness as the ratio of external trade to GDP averaged 45.7025(SD = 12.3859) a maximum of 64.0674 and a minimum of 21.3443. This indicates external trade comprises a significant component of GDP and has positive impacts on the GDP.

The trade tariffs as measured by the ratio of Trade Tariff to imports averaged 9.7533 (SD = 3.2280) a maximum of 16.1611 and a minimum of 5.1255. This indicates trade tarrifs comprise a small component of the exports and this indicates that the taxes on international trade are either lower or that there is under declaration in the imports.

This results in lower tax rates for the imports which would consequently reduce the amount of taxes collected.

The FDI: GDP averaged 1.9650 (SD = 2.5422) a maximum of 11.8396 and a minimum of 0.0541. The indications are that FDI averaged 2.0 % of the Gross Domestic Product and thus is insignificant to contribute to the growth in government tax revenue and insignificant to impact the GDP growth.

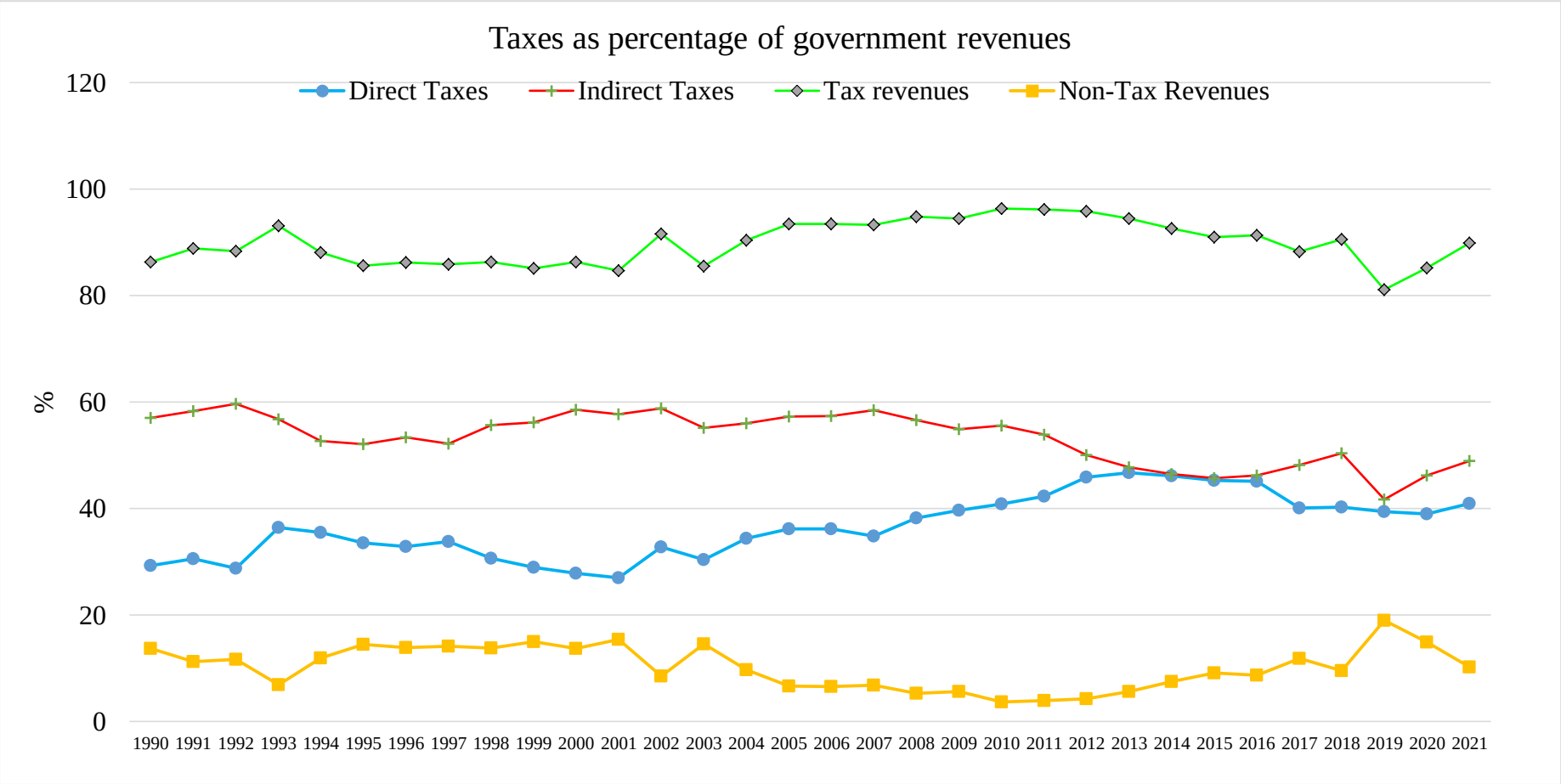
4.1.2 Trends in government revenues

Graph 4.1 illustrates the trends of different taxes collected by the government of Kenya since 1990. As indicated by the graph, the total tax revenues on consumption averaged over 80 per cent of the total government revenues and stabilized at 85% of the total government revenues. On the converse, the non–tax revenues averaged 15% of government revenues in the 1990s, before dropping to an average of 10 per cent between 2005 and 2018 and rising to 19% in 2019 and regressing to 10% in 2021. The trend shows that the government is heavily reliant on tax revenues as the main government revenue as opposed to non–tax revenues.

Regarding the tax revenues on consumption, the trend shows that indirect taxes averaged between 52% and 60% of total government revenues between 1990 and 2011 before dropping to a range of between 42% and 50% in 2012. On the converse, the trends on direct taxes averaged 32% in the 1990s before rising to an average of 33% and 40 % from 2002 to 2010 and gradually rising to an average of 41% to 46% from 2011 to 2016 and easing to an average of 40% from 2017 onwards. The trends show that the government is heavily reliant on indirect taxes as the main government

revenue during the period. Direct taxes seemingly fluctuate drastically from year to year and seems to be compensated by the rise in other taxes that are mainly indirect.

The changes in the overall tax regime also show that the fluctuation may also relate to the government of the day. For instance, the KANU government heavily relied on indirect taxes which ranged between 52% to 59% of the total government revenue and other non – taxes revenues which ranged over 10% of the government revenues. The NARC/PNU government heavily improved on the collection of direct taxes as a percentage of government revenues as the direct taxes rose 31% (2003) to 47% (2014) though with lagged effect, while the Jubilee government has regressed to dependences on indirect taxes and non – tax revenues. During the first period of the Jubilee government, direct taxes dropped from 46% (2014) to 40% (2019) and save for the COVID-19 pandemic effect on direct taxes in 2020(39%) and 2021(41%) fiscal years. On the converse, the indirect taxes seem to have plateaued to less than 50%. Further, the ratio of non-tax revenues has gone up from an average of 6% (2013) to 19% (2019).



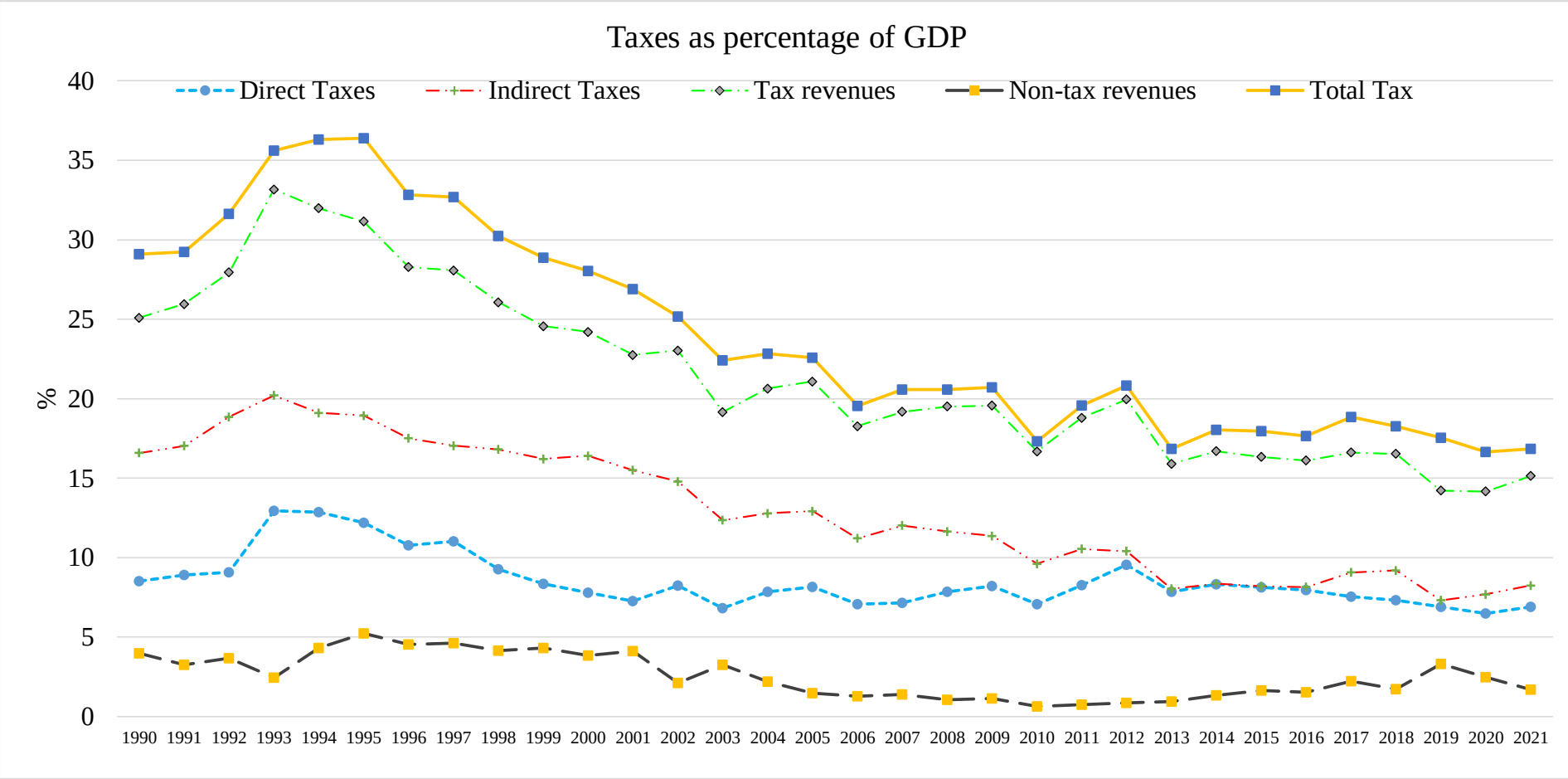
Graph 4.1: Taxes as Percentage of Government Revenues

4.1.3 Trends on taxes as a percentage of GDP

Graph 4.2 illustrates the trends of different taxes collected by the government of Kenya since 1990 as a percentage of GDP. As indicated by the graph, the total tax collections (tax and non-tax revenues) were at their highest in 1994 at 36 % GDP, before gradually dropping to 23 % GDP in 2005 and gradually easing to 18% GDP in 2019 and 17% in 2020 and 2021(COVID – 19 era). To the same extent, the total tax revenues followed the same trend with the highest figure at 33% GDP in 1994 before dropping gradually to 21% GDP in 2005 and easing to 14% GDP in 2019 and 15% GDP in 2021.

The indirect taxes largely dropped from their peak of 20 % of GDP in 1994 to 10 % of GDP in 2012 and eased to less than 10 % of GDP as of 2013. The same trend is replicated by the direct taxes which was at its highest figure of 13% of GDP in 1994 and gradually eased to 7% of GDP in 2021.

The indications are that the general tax growth in Kenya is marginally negligible to the GDP growth and thus as the GDP grows, the tax collections have largely lagged behind the GDP growth and thus the tax- GDP ratio is decreasing with the years.



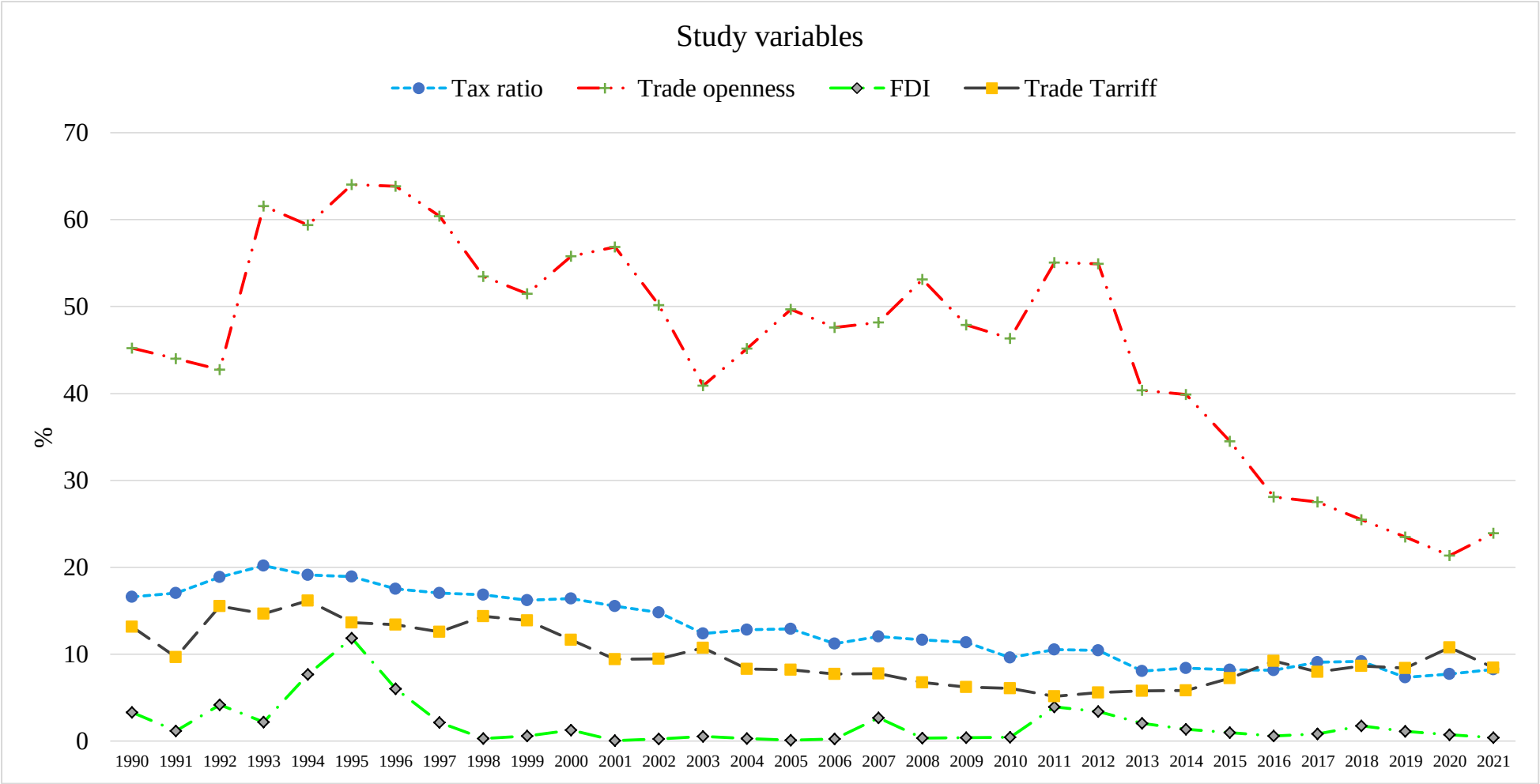
Graph 4.2: Taxes as a Percentage of GDP

4.1.4 Trends on study variables

Graph 4.2 illustrates the trends of study variables since 1990. The graphs show that the indicators of trade openness as measured by the ratio of external trade to GDP are significant with the measure averaging over 50% for the better part of the 1990s and dropping to 41% in 2002 and then fluctuating between 45% (2004) and 55% (2012) and gradually easing to 24% in 2019 save for the COVID-19 effect in 2020. This indicates that the GDP is growing at a faster rate than external trade.

The tax ratio as measured by the ratio of indirect tax to GDP has gradually dropped from 20% in 1994 to 8% in 2021. The trade tariffs as measured by the ratio of Trade Tariff (Custom duties and other taxes on international trade and transactions) to imports gradually fell from their highest peak of 16% in 1994 to 11% in 2003 and eased to an average of between 8% in 2004 to 6% in 2014 and slightly rising to between 7% in 2015 and 8% in 2021. Lastly, the FDI: GDP ratio is marginal and has stayed relatively below 5% for most of the time.

The indications are that the GDP is significantly growing at a faster rate than the tax revenues, external trade and foreign direct investments. In particular, the external trade (exports and imports), and taxes are gradually and significantly growing at a lower rate than the GDP. Further, the amount of FDI is too insignificant to impact the GDP growth.



Graph 4.3: Comparative graphics for study variables

4.2 Diagnostic Test for Panel Regression

4.2.1 Test for Normality

Table 4.2: Normality Test

Variable	**Kurtosis**	**Skewness**	**Jacque-Bera**	**p-value**
Trade openness	9.618	0.2818	908.23	0.1760
Trade Tariff	15.150	-2.004	369.8	0.2340
FDI	2.244	0.165	14.000	0.1200
ICT usage	8.431	-1.00	690.21	0.1020

The results in Table 4.2, indicate that Jacque – Bera test on residual is significant therefore, it is to conclude that the null hypothesis that the residuals are normally distributed is not rejected.

4.2.2 Unit Root Test

Table 4.3 Unit Root Testing

Variable	Lags	Levin Li Chu (LLC) test		Breitung test	
		t	p-value	λ	p-value
Trade openness	0	-8.744	0.000	2.049	0.978
	1	-17.768	0.000	-2.885	0.002
	2	-22.603	0.000	-6.024	0.000
Trade tariff	0	-11.052	0.000	-1.192	0.116
	1	-24.441	0.000	-4.480	0.000
	2	-31.674	0.000	-6.690	0.000
FDI	0	-12.666	0.000	0.459	0.677
	1	-19.868	0.000	-5.093	0.000
	2	-23.486	0.000	-7.725	0.000
ICT	0	-5.629	0.000	-2.610	0.000
	1	-14.808	0.000	-7.718	0.000
	2	-20.691	0.000	-14.76	0.000

Based on the results from Table 4.3, the Levin–Lin–Chu bias-adjusted t statistic for all the variables at 0 lags is significant at all the usual testing levels. Therefore, the study rejected the null hypothesis and conclude that the series is stationary. For the Breitung, λ – statistic, for all the variables at 0 lags are not significant at all the usual testing levels, therefore, the null hypothesis of a unit root at the 5% level cannot be rejected and conclude that the series is stationary.

4.2.3 Test for Heteroscedasticity

The study examined heteroscedasticity through the use of the Breusch-Pagan-Godfrey test with a finding of non-significance ($p > 0.05$) indicating that the null hypothesis that homoscedasticity can be upheld (Garson, 2013). Otherwise, heteroscedasticity is present in the data.

Table 4.4: Test for Heteroscedasticity

Regression model	**χ^2 value**	**p-value**	**Conclusion**	**Action**
Direct effect model	0.24	0.6259	homoscedasticity can be upheld	None
Moderated effect model	0.01	0.9086	homoscedasticity can be upheld	None

Source: Research Data (2023)

The statistical test for examining the presence of heteroscedasticity in Table 4.4 shows that both the direct and the moderated effect models have non – significant Breusch-Pagan-Godfrey test values ($p > 0.05$). This indicated that homoscedasticity could be upheld.

4.2.4 Test for Autocorrelation

Montes-Rojas and Sosa-Escudero (2011) indicated that non-normalities severely affect the performance of the panel-heteroskedasticity tests. Since the heteroscedasticity test is subject to the non-normality in the data, the study used feasible generalized least squares (FGLS) method to control for autocorrelation as well as heteroscedasticity as empirical evidence to support the use of FGLS estimation in solving the heteroscedasticity and autocorrelation in the data (Khaoula & Moez, 2019)

4.2.5 Test for Multicollinearity

The study used: the variance inflation factor (VIF) $\leq$ 10 and a tolerance figure, 1 / VIF $\geq$ 0.1 to detect multicollinearity (Sekaran & Bougie, 2010).

Table 4.5: Test for multicollinearity

Model	Variable	Tolerance	VIF	Conclusion
Direct effects	Trade openness	0.7693	1.30	No collinearity
	Trade tariff	0.7757	1.29	No collinearity
	Foreign Direct inflows	0.7088	1.41	No collinearity
Moderated	Trade openness	0.1162	8.60	No collinearity
effects	International trade	0.2140	4.67	No collinearity
	Foreign Direct inflows	0.4129	2.42	No collinearity
	ICT	0.4064	8.60	No collinearity
	Trade openness*ICT	0.4802	9.83	No collinearity
	Trade tarriff*ICT	0.3926	7.47	No collinearity
	Foreign Direct inflows*ICT	0.3640	8.47	No collinearity

Source: Research Data (2023)

The results in Table 4.5 showed that the VIF figures range between 1.29 and 8.60 while the tolerance value range between 0.11 and 0.77, thus, it can be inferred that multicollinearity was not encountered in the dataset.

4.2.5 Hausman Specification Test

Table 4.6 Hausman Specification Test

Model	**χ^2**	**p-value**	**Interpretation**
Direct effect	0.0069	0.934	Fixed effects model is appropriate
Moderated effect	0.4314	0.511	Fixed effects model is appropriate

The statistical value shows that the Hausman specification test for the direct effects model and the $\chi 2$ statistical values for direct and moderated effects models are not significant ($p > 0.05$). Therefore, the null hypothesis that the random effect model is appropriate is rejected and the conclusion is that the fixed effects model is the more appropriate model.

4.2.6 Test for Correlations

The study used Pearson's correlation coefficient(r) to examine for the presence of significant correlations between the study variables (Cooper & Schindler, 2014).

Table 4.7: Test for Correlations

	Tax ratio	Trade openness	FDI	Trade Tariff	ICT use	Openness*ICT	FDI*ICT	Tarriff*ICT
Tax ratio	1.0000							
Trade openness	0.7554*	1.0000						
FDI	0.4723*	0.4476*	1.0000					
Trade Tariff	0.8124*	0.3534*	0.4400*	1.0000				
ICT use	-0.7381*	0.7645*	-0.4649*	-0.6960*	1.0000			
Trade Openness*ICT	-0.8173*	-0.3823*	-0.4766*	-0.8404*	0.8475*	1.0000		
FDI*ICT	-0.4290*	-0.0346	0.0768	-0.5628*	0.4077*	0.6048*	1.0000	
Tarriff*ICT	-0.4644*	-0.1280	0.0173	-0.5336*	0.4847*	0.6356*	0.6995*	1.0000

*Significance levels at the 0.05 level (2-tailed).

Source: Research Data (2023)

Table 4.7 concerns the correlations between the study variables. The dependent variable, tax ratio positively correlates with the trade openness ($r = 0.7554$, $p < 0.05$) which indicates that a positive change in the trade openness is linked to a positive change in tax ratio. The tax ratio positively correlates with FDI ($r = 0.4723$, $p < 0.05$), thus a change in FDI is linked to resultant change in tax ratio, while trade tariffs positively correlate with tax ratio ($r = 0.8124$, $p < 0.05$). This implies that any positive change in the trade tariffs is associated with a significant positive change in the tax ratio. The ICT usage negatively correlates with tax ratio ($r = -0.7381$, $p < 0.05$) and this implies that a positive change in the ICT usage is linked to a opposite and negative change in tax ratio, while the interaction effects of ICT use on trade openness ($r = -0.8173$, $p < 0.05$), FDI ($r = -0.4290$, $p < 0.05$), trade tariffs ($r = -0.4644$, $p < 0.05$). These would indicate any change in the interaction effects of ICT use on trade openness, FDI and trade tariffs is associated with a negative change in the tax ratio.

4.3 Test of Hypothesis

The study used results of the panel regression analysis are indicated in Table 4.5.

Table 4.8: Moderated Effect of ICT on government tax revenue

	Direct Effects Model			Moderated Effects Model		
Variable	**β**	**t**	**p-value**	**β**	**t**	**p-value**
Constant	-3.0364	-2.94	0.006	9.2251	3.73	0.001
Trade openness	0.5547	8.73	0.015	0.1697	1.40	0.174
Trade Tariff	0.6422	10.15*	0.000	0.3205	3.13	0.005
Foreign direct inflows	-0.0586	-0.89	0.006	0.0225	0.37	0.714
ICT use				-0.7889	-3.54	0.002
Trade Openness*ICT				0.2430	1.14	0.264
Trade Tariff*ICT				0.2226	0.94	0.355
FDI*ICT				-0.2413	-1.00	0.329
N	32			32		
R^2	0.9130			0.9582		
Adjusted R^2	0.9037			0.9461		
F-Statistic	98.00			78.67		

* indicates statistical significance at the 0.05 level
Source: Research Data (2023)

4.3.1 Hypothesis One

The study sought to assess the effect of trade openness on government tax revenue in Kenya and tested the H_{01}: Trade openness has no impact on government tax revenue in Kenya. The statistical values in Table 4.8 show that the F - statistic = 98.00 (p = 0.000) means that the model was statistically significant. This indicates that trade openness explains about 45.6 per cent changes in the trade tax ratio. The beta coefficients: trade openness, $\beta_1 = 0.5547$ ($t = 8.73$, $p < 0.00$). This indicates that trade openness has a significant positive effect on the trade tax ratio. Thus, the equation predicting the effect of the trade tax ratio takes the form; Y = -3.0364 + 0.5547 (trade

openness). The above regression model implies that a unit change in trade openness results in 0.5547-unit changes in the trade tax ratio. Based on this finding, the study, therefore, rejects the H_{01}: Trade openness has no impact on government tax revenue in Kenya and concludes that trade openness has a significant positive effect on government tax revenue in Kenya.

The positive effect of trade openness on tax revenues has been illustrated by empirical studies which showed that the trade policies either increase tax revenues (Gnangnon, 2019; Gaalya, Edward & Eria, 2017) or reduce tax revenues (Kotani and Kakinaka, 2021; Khattry & Rao, 2015; Baunsgaard and Keen, 2015). In the study, the significant positive effect of trade openness could be explained by the methodology which was simplified (multiple linear regression) as opposed to panel data analysis and Autoregressive Distributed Lag (ARDL) cointegration technique used by the different studies.

4.3.2 Hypothesis Two

The study sought to establish the impact of international trade on government tax revenue in Kenya and tested the H_{02}: international trade has no impact on government tax revenue in Kenya. The statistical values in Table 4.5 show that the F - statistic = 98.00 ($p = 0.000$) means that the model was statistically significant. This indicates that international trade explains about 45.6 per cent changes in tax ratio. The beta coefficients: trade tariffs, $\beta_2 = 0.6422$ ($t = 10.15$, $p < 0.00$). This indicates that international trade has a significant positive effect on the trade tax ratio. Thus, the equation predicting the effect of the trade tax ratio takes the form; $Y = -3.0364 + 0.6422$ (international trade). The above regression model implies that a unit change in

international trade results in 0.6422-unit changes in the trade tax ratio. Based on this finding, the study, therefore, rejects the H_{02}: international trade has no impact on government tax revenue in Kenya and concludes that international trade has a significant positive effect on government tax revenue in Kenya.

The positive effect of international trade on tax revenues has been illustrated by empirical studies which showed that the removal of trade barriers either increases tax revenues in the long run (Gnangnon and Brun, 2019; Moller, 2016; Baunsgaard and Keen, 2015; Hisali, 2012; Gaalya, 2015) or reduces tax revenues (Epaphra & Massawe, 2017; Shinyekwa &. Othieno, 2016). The long–run positive effect of international trade occurs through the gradual transition in the tax structures which results in the progressive replacement of domestic direct tax revenue with indirect trade tax revenue (McNabb & LeMay-Boucher, 2014). The study is in agreement with the extant literature.

4.3.3 Hypothesis Three

The study sought to determine the effect of foreign direct inflows on government tax revenue in Kenya and tested the H_{03}: Foreign direct inflow has no effect on government tax revenue in Kenya. The statistical values in Table 4.5 show that the F - statistic = 98.00 ($p = 0.000$) means that the model was statistically significant, however, the beta coefficients: foreign direct inflows, $\beta_3 = -0.0585$ ($t = -0.89$, $p > 0.00$). Based on this finding, the study does not reject the H_{03}: Foreign direct inflow has no effect on government tax revenue in Kenya and concludes that foreign direct inflow has no effect on government tax revenue in Kenya

The insignificant effect of the FDI on tax revenues has been illustrated by empirical studies which showed that foreign direct investments have a lagged positive effect on tax revenues in the long run (Bayar and Ozturk, 2018; Andrejovska and Pulikova, 2018; Mahmood and Chaudhar, 2013) or a weaker association with tax revenues (Bunescu & Comaniciu, 2014; Bayar & Ozturk, 2018) or a negative effect. The insignificant effect in the study divergence from the findings of the previous studies and thus may be attributed to the use of regression analysis while the aforementioned studies used autoregressive distributed lag cointegration technique, panel regression analysis and general method of moments.

In explaining the insignificant effect, first, the study considers the positive effect of the FDI on tax revenues. Foreign direct investments had a lagged positive direct effect on tax revenues through trade and consumption (Andrejovska and Pulikova, 2018; Odabas, 2016). FDI also influences the consumer, tax revenues and economic development. foreign direct investment is considered to have a direct impact on trade through which the growth process (Olusanya, 2013). FDI inflows also affect the host countries' economies. It conveys capital accumulation and technological diversification that enhances the recipient economy (Reza *et al.*, 2018).

4.3.4 Hypothesis Four

The study sought to evaluate the moderating effect of ICT usage on the relationship between trade liberalization and government tax revenue in Kenya and tested the H_{04}: ICT usage does not moderate the relationship between trade liberalization and government tax revenue in Kenya. The statistical values in Table 4.5 show that the F - statistic = 78.67, ($p = 0.000$) means that the model was statistically significant. This

indicates that the moderating effect of ICT on trade liberalization components explains about 95.82 per cent changes in the trade tax ratio. The beta coefficients: ICT usage, β_4 = --0.7889(t = -2.60, p < 0.05), however, the interaction effects of ICT on trade openness, β_5 = 0.2429(t = 1.14, p > 0.05); trade tariff, β_6 = 0.2226 (t = 0.94, p > 0.05); FDI, β_7 = -0.2413 (t = -1.00, p > 0.05) and are not significant. Though there is an increase in the explanatory power, the effect size of the factors is reduced. The addition of the variable ICT increases the explanatory power slightly but then the effect size of the ICT usage is negative and thus antagonizes the positive effect of the This indicates that ICT has a significant negative moderating effect on trade tax ratio.

Thus, according to Fairchild and Mackinnon (2009), the moderator variable affects the strength and/or direction of the relation between a predictor and an outcome either by enhancing, reducing, or changing the influence of the predictor. In this instance, the moderator reduced the effect of the trade openness from (β_1 = 0.5547 (t = 8.73, p < 0.05) to β_1 = 0.1697 (t = 1.40, p > 0.05); and the effect of trade tariff from β_2 = 0.6422 (t = 10.15, p < 0.00) to β_2 = 0.3205(t = 3.13, p < 0.05). This implies that ICT adoption and usage have a significant negative moderating effect by reducing the effect of the predictors; trade openness and international trade. Based on this finding the study therefore rejects the H_{04}: ICT usage does not moderate the relationship between trade liberalization and government tax revenue in Kenya and concludes that ICT usage has a significant negative moderating effect on government tax revenue in Kenya.

The significant negative moderating effect of ICT usage on tax revenues has been illustrated by empirical studies which showed that ICT has a positive effect on tax (Okunogbe & Santoro, 2022; Okunogbe, 2013; Bellon *et al.*, 2019; Olushola, 2015;

Fan *et al.,* 2018) and an indirect effect (Olatunji & Ayodele, 2017). The significant negative effect in the study is a divergence from the findings of the previous studies and thus may be attributed to the focus that includes tax collections, tax mapping and the levels of ICT adoption.

The effect of ICT occurs through various ways that include the enhancement of tax administration, cost-effective mechanisms and increased employee productivity. The use of ICT enhances timely access to accurate and relevant information and provides alternative formats to the work process such as printing and saving documents and thus easier, faster, and cheaper information storage (Chatama, 2013). Increased ICT investment is also used as a tool to achieve greater efficiency and effectiveness in managing businesses (DeČman *et al.,* 2010).

4.4 Discussion

Trade openness affects tax revenue performance either negatively or positively depending on the economic structures of an economy or region (Reza *et al.,* 2018). The positive effect of trade openness to government tax revenues occurs directly through its effects on personal income and indirectly through its effects on economic growth. trade openness is found to have positively affected the level of investment and the rate of economic growth (Musila & Yiheyis, 2015; Nowbutsing, 2014). Trade openness tends to promote favourable trade policies and tend to increase international trade which results in both direct and indirect taxes. Gaalya, Edward and Eria (2017) consider the influence of trade openness on tax revenue to be an indirect effect. This indirect effect is derived from the response of consumption and production decisions to price changes, which the price changes are triggered by trade reforms.

Openness to trade has positive effects on financial development, capital accumulation, and economic development. Trade openness potentially enhances economic growth by providing access to goods and services, achieving efficiency in the allocation of resources and improving total factor productivity through technology diffusion and knowledge dissemination (Keho, 2017). Trade exerts a positive and significant effect on economic growth rate in developed and developing countries The real effect of trade also depends on the level of financial development and inflation. openness to trade stimulates both economic growth and investment. Besides, trade policies such as average weighted tariff rate and real effective exchange rate affect economic performance through trade.

Openness affects growth through several channels such as exploitation of comparative advantage, technology transfer and diffusion of knowledge, increasing economies of scale and exposure to competition. Also, economies with higher trade openness have higher economic growth (Leitão & Rasekhi, 2013). Trade openness substantially raises income and is related to high levels of economic growth and countries that have opened up to trade have increased their levels of growth and income taxes. Thus, trade openness induces higher volumes of trade and is associated with higher incomes (Gaalya, Edward & Eria, 2017). However, openness to trade harms growth in countries with low financial development but has an insignificant impact in countries with high financial development (Keho, 2017).

The positive relationship that exists between global trade and economic growth may be a result of the likely positive externalities due to the involvement of different countries in international trade (Agbo *et al.,* 2018). The effect of international trade on

tax occurs directly through the direct contribution of the import and export taxes and indirectly through the effect of international trade on the economy. A reduction in import tariffs is likely to influence imports and tax revenue depending on the elasticity of import demand and the price elasticity of supply for import substitutes (Nowbutsing, 2014). International trade stimulates economic growth through investment. FDI play a significant role in productivity growth in those countries (Reza *et al.,* 2018).

Increased international trade gives rise to an erosion of corporate tax bases in high-tax industrialized countries, a decline in tax revenues and a rise in competition among governments. Countries seeking to attract and retain mobile investment and the associated tax revenues may be induced to reduce tax rates below the levels that would obtain in the absence of mobility (Hong & Smart, 2010). Openness to international trade is beneficial to economic development, especially for developing countries (Keho, 2017). Consumers have more income as the economy grows, therefore higher purchasing power and higher demand for domestic consumption. This increase in consumption tend to lead to increases in both direct and indirect taxes, when tariff are increased, total taxes, indirect taxes and trade taxes also increases (Gaalya, Edward & Eria, 2017).

FDI facilitate economic growth through direct as well as indirect channels (Shar & Malik, 2017). First, FDI stimulates competition and consequently growth. Second, FDI through the channel of learning the labour force may affect growth. Third, technology imitation by domestic firms raises growth. In general, the spillover of FDI on domestic labour efficiency increase in competition, upgrading the products'

qualities and development of markets are other factors that are important in affecting FDI on growth (Leitão & Rasekhi, 2013). The indirect effect of the FID occurs through the simultaneous effect of FDI inflows and trade openness on economic growth. Foreign direct investment (FDI) plays an important role in the economic growth of developing countries. It influences the employment scenario, production, prices, income, imports, exports, the general welfare of the recipient country, and the balance of payments and serves, as one of the vital sources of economic growth (Hussain & Haque, 2016). FDI could stimulate economic growth through spillover effects such as new technologies, capital accumulation, increased export, and human capital development (Belloumi & Alshehry, 2018).

FDI exerted an initial negative effect on domestic investments but a subsequent positive effect in later periods. Thus, foreign direct investment inflows harm economic growth in both the short and long run (Belloumi & Alshehry, 2018). Unfortunately, most countries in Africa fail to attract foreign direct investment, yet their economies are in obvious need of foreign direct investment in the continent (Olusanya, 2013). Foreign direct investment exerts a positive effect on economic growth, but there seems to be a threshold level of income above which foreign direct investment has a positive effect on economic growth and below which it does not. Thus, only those countries that have reached a certain income level can absorb new technologies and benefit from technology diffusion, and thus reap the extra advantages that foreign direct investment can offer (Olusanya, 2013).

The development of ICT applications alters the approach to organizational function and eventually, improves their services as well as products as well as organizational

growth (Chatama, 2013) ICT use in the context of taxation focuses exclusively on the digitalization of tax procedures and supports the argument that the level of compliance in taxation is improved by simplifying tax procedures, tax-filing systems, and tax payments via electronic services (Sidani *et al.,* 2014; Night and Bananuka, 2019). Decman *et al.,* (2010) examined the impact of ICT use on the efficiency of government procedures.

New technology can radically improve the efficiency and effectiveness of public services (Decman *et al.,* 2010). ICT adoption positively moderates the association between the digitalization of government services and tax evasion; that is, the digitalization of government services has a stronger effect on mitigating tax evasion in countries where ICT adoption is higher (Uyar *et al.,* 2021). Night and Bananuka (2019) examined the mediating effect of adopting an e-tax system on the association between the attitude toward the e-tax system and tax compliance in small and medium-sized business enterprises in Africa. The digitalization of government services could alleviate tax evasion in two ways: First, improving tax procedures in general and the tax-filing system, in particular, would improve the efficiency of the tax system and, consequently, increase tax compliance (Decman *et al.,* 2010; Bhuasiri *et al.,* 2016). Second, the improved efficiency and effectiveness of the government would lead to lower corruption and, consequently, lower tax evasion (Nam, 2018; Suhendi *et al.,* 2020).

Brun *et al.,* (2020) affirmed that ICT readiness and ICT usage are effective in tax revenue mobilisation Additionally, ICT usage boosts direct tax revenues through personal income tax, and indirect tax revenues through VAT and the passthrough

effect is apparent via three channels— control of corruption, government effectiveness and tax compliance. ICT diffusion tends to broaden the tax net, particularly regarding goods and services, and fight tax-related corruption and complexities associated with analogue-based tax systems (Akitoby 2018). ICT diffusion enhances goods and services tax (GST), and profits, corporate and income tax (PCIT) mobilisation efforts in Africa (Ofori, Ofori and Asongu, 2022).

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMENDATION

5.0 Introduction

The chapter presents a summary, conclusion and implications of the study findings. The chapter finalizes the recommendations for further studies. In addition to the summary and conclusion, the chapter covers other areas such as contributions to the study and suggestions for further research.

5.1 Summary

Tax revenues form the main source of revenue for the government of Kenya and thus its optimization portends well for the country. The findings indicated that indirect taxes comprise over half of the government tax revenue, while direct taxes contribute 40% while non–tax revenue makes up 10%. However, the tax-to-GDP ratio stands at about 15% which is considerably low for a middle–income developing economy. The FDI ratios are falling while the GDP is growing at a faster rate than the taxes and thus tax revenue seems to be underperforming.

5.1.1 Objective One

The descriptive statistics indicated that the ratio of external trade to GDP gradually eased to below 50% in the 2000 – 2010 decade and rose to 55% in 2012 before gradually easing to 24% in 2019. This indicates that the GDP has grown faster than the amount of external trade.

The study findings showed that trade openness has a positive impact on government tax revenue in Kenya with the trade openness indicator explaining about 45.6 per cent changes in the trade tax ratio with an effect size, of $\beta_1 = 0.5547$, $p < 0.00$.

5.1.2 Objective Two

The descriptive statistics showed that the ratio of indirect tax to GDP has been gradually decreasing to less than 10% of GDP over longer periods. This signifies that the Trade tariff (Customs duties and other taxes on international trade and transactions) is decreasing as the GDP grows further. The finding indicates that international trade has a positive impact on government tax revenue in Kenya and that international trade explains about 45.6 per cent changes in tax ratio with a size, $\beta_2 = 0.6422$, $p < 0.00$.

5.1.3 Objective Three

The descriptive statistics showed that the ratio of FDI to GDP has been generally low at all times with the ratio being below 5% for most of the time. This signifies that the FDI is not having a significant impact on GDP because the FDI figures are generally low when compared to the GDP. The study findings indicated that indicators of foreign direct inflows have no effect on government tax revenue in Kenya because the FDI figures are relatively low to make a significant effect on GDP.

5.1.4 Objective Four

Based on the officials' records, the KRA trialled the automation process in the early 2000 and adopted the use of ICT in 2005 at a basic level of connecting and improving work processing at the organizational level. Later on in 2004, the KRA upscale and improved the use of ICT for the management of taxpayers and upscaling the ICT to the levels of integration with taxpayers in 2015.

The study findings indicated that ICT has a negative moderating effect on the relationship between trade liberalization and government tax revenue in Kenya with the ICT usage having a negative effect size, 0.5372 $p < 0.00$. The negative effect arises because of the slow uptake of the ICT and thus the lagged effect could not be measured.

Table 5.1 Summary of Hypotheses Testing

Hypothesis	**Results**	**Key Findings**
H_{01}: Trade openness has no impact on government tax revenue in Kenya	Reject H_{01}	Trade openness has a significant positive effect on government tax revenue in Kenya.
H_{02}: International trade has no impact on government tax revenue in Kenya	Reject H_{02}	International trade has a significant positive effect on government tax revenue in Kenya.
H_{03}: Foreign direct inflows have no effect on government tax revenue in Kenya.	Failed to reject H_{03}	Foreign direct inflow has no effect on government tax revenue in Kenya
Ho_{4a}: ICT usage does not moderate the relationship between trade openness and government tax revenue in Kenya.	Reject H_{04a}	ICT usage has a significant negative moderating effect on trade openness and government tax revenue in Kenya.
Ho_{4b}: ICT usage does not moderate the relationship between international trade and government tax revenue in Kenya.	Reject H_{04b}	ICT usage has a significant negative moderating effect on international trade and government tax revenue in Kenya.
Ho_{4c}: ICT usage does not moderate the relationship between foreign direct investments and government tax revenue in Kenya	Reject H_{04c}	ICT usage has a significant negative moderating effect on foreign direct investments and government tax revenue in Kenya.

5.2 Conclusion

The first objective sought to examine the effect of the trade openness on government tax revenue and the descriptive statistics showed that the trade openness is falling below 50% and this indicates that the country is more open to external trade. The study rejected the null hypothesis and thus trade openness positively contributes to government tax revenues.

The second objective sought to evaluate the effect of international trade on government tax revenues and the trade tariffs have gradually dropped to less than 10%. This indicates that the country's external trade is significant and the study therefore rejects the null hypothesis and the conclusion indicates that international trade positively contributes to government tax revenues.

The third objective sought to determine the effect of the FDI on government tax revenue. The descriptive statistics indicated that the FDI ratio is below 5%. The study did not reject the null hypothesis and therefore the study concluded that FDI does not contribute to the government tax revenues.

The fourth objective sought to examine the moderating effect of ICT use on trade liberalization and government tax revenues. The study rejected the null hypothesis and concluded that ICT adoption and use have a negative significant moderating effect on government tax revenues. ICT use seems to negative impact on the growth of government tax revenues.

5.3 Recommendation

5.3.1 Policy Recommendation

1) Since indirect taxes form the bulk of the taxes, the tax agency should seek ways to improve the direct taxes to increase the amount of taxes raised locally. This can be improved through the expansion of taxation brackets for individuals, bringing in individuals from the informal sector into the taxation scales, and providing tax incentives to defaulters.
2) The findings showed that trade openness and Trade tariffs have a positive impact on tax and therefore the study recommends that the tax agency should seek to improve the amounts of taxes due from international trade. This can be achieved through the integration of trading platforms between the countries and thus increase the transparency in trade enabling the effectiveness of the taxation regimes. Further, the tax agency should reduce and/or simplify the taxation procedures for international trade, therefore, increasing compliance.
3) The government should introduce a favourable taxation policy on individuals to increase direct taxes. This can be achieved through the promotion of national ideals, drawing out solidarity and affiliation to the country's efforts to grow and develop.

5.3.2 Managerial Recommendation

1) The ICT usage by the government tax agent has a negative effect and therefore the tax agency should institute measures to make ICT usage pervasive in the organization. This is achieved through the adoption of integrated information systems that bridge the taxpayer and the agency.

5.3.3 Recommendation for Further Studies

The study was able to generate new information and knowledge and tested the effects of indirect taxes in Kenya. The findings from the study illustrated the impact of indirect taxes in Kenya and thus other studies may focus on the main tax variable but not limited to the following:

1. The study captured a minimum data point for regression analysis and thus the findings are significant to the limitation of the methodology.
2. More studies can be done on the different forms of taxes as opposed to the use of cumulative taxes.
3. Other studies may look into other significant variables that affect tax collection.

5.4 Contributions to Knowledge

The study advances the existing knowledge in taxation by measuring the effect of ICT usage on trade liberalization and tax revenue in Kenya. First, it measured the impacts of the international trade regime in Kenya and its effects on government tax revenue. Second, identified and measured the influence of information and communication technology in improving the efficiency of tax collection efforts. Most studies were done in a developed country context) among other countries.

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APPENDIX

Appendix 1: Government Fiscal Tax Collections

Table 1: Government fiscal tax collections

	Tax as % of tax revenues		Tax as % of total tax collections			
Fiscal year	Direct taxes	Indirect tax	Direct taxes	Indirect taxes	Tax revenues	Non-tax revenues
2004/2005	37.58	62.42	34.81	57.82	92.63	7.37
2005/2006	39.78	60.22	37.11	56.19	93.29	6.71
2006/2007	37.79	62.21	35.21	57.96	93.16	6.84
2007/2008	40.50	59.50	37.33	54.85	92.18	7.82
2008/2009	41.54	58.46	39.78	55.97	95.75	4.25
2009/2010	41.97	58.03	40.48	55.97	96.44	3.56
2010/2011	43.50	56.50	41.85	54.35	96.20	3.80
2011/2012	47.34	52.66	45.40	50.51	95.92	4.08
2012/2013	48.93	51.07	46.27	48.29	94.57	5.43
2013/2014	47.56	52.44	45.83	50.53	96.36	3.64
2014/2015	49.84	50.16	45.78	46.07	91.85	8.15
2015/2016	50.14	49.86	46.12	45.86	91.98	8.02
2016/2017	46.46	53.54	43.42	50.03	93.45	6.55
2017/2018	45.43	54.57	42.08	50.54	92.62	7.38
2018/2019	44.36	55.64	40.35	50.61	90.95	9.05
2019/2020	45.65	54.35	38.88	46.28	85.16	14.84

Source: KNBS Annual Economic Surveys (2008 to 2020)

Table 1.1: Average tax rates for different economy clusters

	Economy clusters		
Type of tax revenue	upper-middle-income countries	Lower middle-income countries	Developing countries
Total tax	26%	22%	21%
Tax	17%	15%	15%
Non – tax	10%	7%	6%
Direct	6%	4%	5%
Indirect	11%	11%	10%

Source: The ICTD government revenue dataset by Prichard, Cobham & Goodall(2014).

Table 1.2: Average tax rates for different regions

Type of tax revenue	Eastern Europe & Central Asia	Latin America	South Asia	East and South-East Asia	Middle East and North Africa	Sub – Sahara Africa
Total tax	26%	21%	16%	25%	30%	20%
Tax	20%	16%	11%	20%	15%	14%
Non – tax	6%	5%	5%	6%	15%	7%
Direct	6%	11%	4%	6%	10%	4%
Indirect	14%	5%	9	14%	8%	11%

Source: The ICTD government revenue dataset by Prichard, Cobham & Goodall (2014).

Appendix 2: Research Data

Year	Imports (Million Kshs)	Exports (Million Kshs)	GDP (Million Kshs)	FDI(USD)	Exchange rate (Kshs/USD)	Income tax (Million Kshs)	VAT (Million Kshs)	Taxes on good & service (Million Kshs)	Trade tarrifs (Million Kshs)	Non -tax revenues (Million Kshs)	Technology adoption on a scale
1990	50,912.60	24,880.20	167,555.60	231,000,000.00	24.08	14,261.60	15,321.40	5,781.00	6,693.60	6,678.80	0
1991	52,918.20	31,042.40	190,806.60	77,500,000.00	28.07	17,027.80	18,555.40	8,827.20	5,118.60	6,232.20	0
1992	59,097.20	34,845.20	219,719.80	253,400,000.00	36.22	19,970.40	22,142.80	10,117.80	9,183.00	8,107.60	0
1993	101,128.40	73,565.00	283,708.20	104,000,000.00	59.15	36,767.20	28,994.40	13,529.80	14,792.80	6,949.40	0
1994	115,079.80	85,642.60	338,064.80	467,500,000.00	55.30	43,505.80	24,533.80	21,472.80	18,598.20	14,620.20	0
1995	155,168.40	97,339.00	394,128.00	902,200,000.00	51.72	48,082.40	28,403.80	25,083.60	21,175.60	20,678.40	0
1996	168,486.20	118,200.00	448,932.60	473,500,000.00	57.22	48,375.00	29,850.00	26,180.20	22,594.00	20,390.00	0
1997	190,673.60	120,445.20	515,011.80	188,400,000.00	58.74	56,805.20	31,455.00	32,356.80	23,949.80	23,753.20	0
1998	197,789.00	121,181.00	596,539.30	26,548,246.00	60.21	55,234.80	39,204.76	32,640.60	28,443.92	24,802.63	0
1999	206,401.00	122,559.00	639,056.20	51,953,456.00	70.91	53,316.99	40,944.19	34,099.38	28,605.16	27,585.05	1
2000	247,804.00	134,527.00	685,436.20	110,904,550.00	76.54	53,428.93	50,522.92	33,159.30	28,803.74	26,306.13	1
2001	290,108.00	147,590.00	770,027.00	5,302,623.00	78.59	55,861.98	50,871.68	41,179.10	27,302.31	31,836.25	1
2002	257,710.00	169,283.00	850,910.10	27,618,447.00	78.62	70,140.28	56,135.25	45,389.69	24,396.09	18,087.95	1
2003	281,844.00	183,154.00	1,136,288.00	81,738,243.00	76.19	77,409.73	58,853.37	51,249.11	30,264.00	36,920.01	1
2004	364,557.00	214,793.00	1,282,504.00	46,063,931.00	79.11	100,702.00	72,291.00	61,457.05	30,203.00	28,289.37	2
2005	443,093.00	260,423.00	1,415,724.00	21,211,685.00	75.30	115,600.50	78,603.00	68,124.49	36,276.00	21,060.06	2

2006	521,483.00	250,994.00	1,622,434.00	50,674,725.00	72.05	114,629.06	79,925.91	61,709.65	40,235.00	20,747.14	2
2007	605,112.00	274,658.00	1,825,960.00	729,044,146.00	67.21	130,719.00	96,497.01	76,111.19	46,949.00	25,425.91	2
2008	770,651.00	344,947.00	2,099,798.00	95,585,680.00	69.65	165,078.00	111,904.51	80,736.09	52,051.00	22,537.89	2
2009	788,097.00	344,949.00	2,366,984.00	116,257,609.00	77.30	194,154.50	126,854.07	93,051.89	49,094.03	27,262.97	2
2010	947,206.00	490,794.00	3,104,303.00	178,064,607.00	79.47	219,496.84	141,970.70	99,335.01	57,205.80	19,580.20	2
2011	1,300,749.00	512,604.00	3,294,026.00	1,450,474,757.00	88.73	272,263.87	171,880.75	108,701.54	66,670.45	25,093.25	2
2012	1,374,587.00	517,847.00	3,444,066.00	1,380,173,662.00	84.66	328,908.78	176,386.07	105,771.60	76,473.85	30,124.37	3
2013	1,413,316.00	502,287.00	4,745,143.00	1,118,825,000.00	86.20	373,086.04	184,916.31	114,821.86	81,812.59	44,551.25	3
2014	1,618,321.50	537,236.00	5,402,410.00	820,937,598.00	88.08	449,590.07	232,630.32	125,363.91	94,232.51	72,600.91	3
2015	1,577,556.00	581,045.60	6,260,646.00	619,724,470.00	98.70	509,159.84	259,685.20	140,243.32	113,953.59	102,160.01	3
2016	1,431,754.50	578,066.90	7,158,695.00	393,359,421.00	101.52	569,811.18	289,213.47	162,593.81	131,916.17	109,561.78	3
2017	1,736,472.10	597,904.10	8,483,396.00	671,488,393.00	103.39	640,546.17	357,128.74	274,126.47	138,285.55	188,694.80	3
2018	1,764,471.50	614,315.70	9,340,307.00	1,625,921,494.00	101.33	685,329.95	414,143.41	291,941.55	152,374.87	161,303.72	3
2019	1,806,334.60	596,676.60	10,237,727.00	1,098,576,664.00	102.15	706,936.33	383,713.19	213,599.83	151,274.15	340,453.34	3
2020	1,643,560.10	643,706.20	10,716,034.00	717,864,354.00	106.62	694,052.52	410,758.40	236,989.75	176,621.78	265,355.52	3
2021	2,151,233.10	743,671.10	12,098,200.00	448,675,764.00	109.88	834,471.79	472,907.22	343,030.60	181,477.23	206,790.76	3

Where the scale of adoption took the nominal scale is interpreted as follows: 0 represents the manual based system of filling taxes, 1 represents the basic automation of ICT devices in organizational functions, 2 represents advanced adoption of ICT devices in processing of taxes, 3 represents organizationwide usage of ICT with marginal integration with the taxpayer, and 4 represents the pervasive and integrative usage of ICT devices with taxpayers' systems (Sirirak *et al.,* 2011).

Appendix 3: Research Authorization

KENYA REVENUE AUTHORITY

ISO 9001:2015 CERTIFIED

PUBLIC

KENYA SCHOOL OF REVENUE ADMINISTRATION

REF: KESRA/NBI/036

12th May 2023

TO: WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: REQUEST FOR ASSISTANCE TO SILVIE CHEMUTAI TERER OF REGISTRATION NO.: KESRA105/0016/2019 UNDERTAKING MASTERS AT KESRA

This is to confirm that the above named is a student at Kenya School of Revenue Administration (KESRA) Nairobi Campus pursuing Masters in Tax and Customs Administration.

The named student is undertaking Research on TOPIC: *"Moderating influence of ICT use on trade liberalization and government tax revenue in Kenya."*

The purpose of this letter is to request for your kind facilitation in enabling the student progress in her research project by allowing access to any relevant information and/or conduct interviews, which are relevant to the project.

Your support to the student in this regard will be highly appreciated.

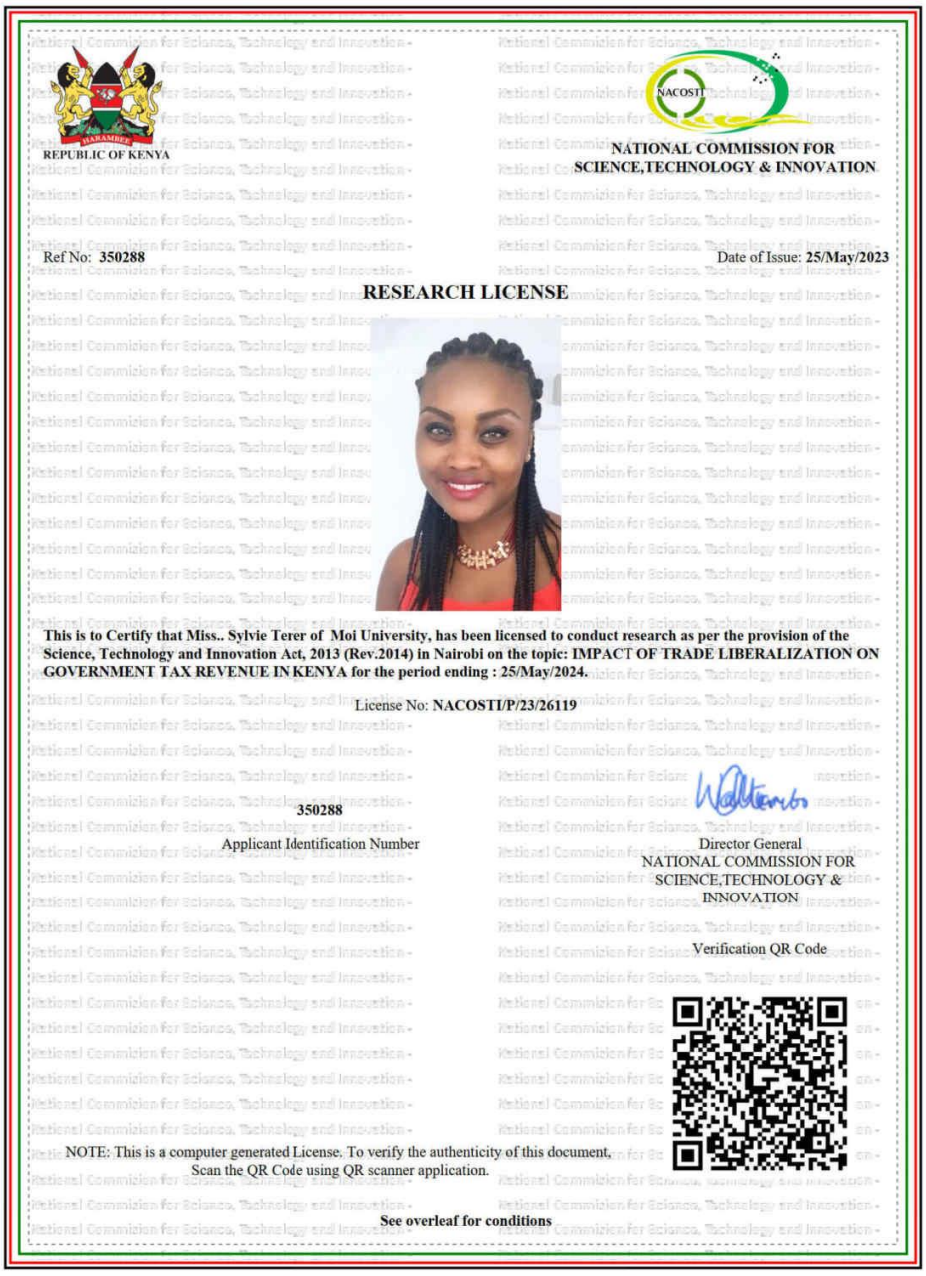
Thank you.

KENYA SCHOOL OF REVENUE ADMINISTRATION
DEAN OF STUDIES
12 MAY 2023
ACADEMIC AFFAIRS

Damacrine Masira
Manager Academic Research,
KESRA

Tulipe Ushuru, Tujitegemee!

Appendix 4: NACOSTI Research Permit



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    iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
    iv. Result in exploitation of intellectual property rights of communities in Kenya
    v. Adversely affect the environment
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