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EDITORIAL

It is my great pleasure to welcome our esteemed readers to this issue of the African Journal of Customs and Fiscal Studies (AJCFS). AJCFS provides an important platform for researchers, academics, practitioners and policy makers to share findings and knowledge of the African economies to address the real-world problems. Since its origin as the Journal of the Institute of Tax Administration (JITA) in 2012, and its rebranding to AJCFS in 2018 to reflect a broader mandate, the journal has steadily evolved in scope, quality, and reach to bridge research, policy, and practice, providing insights to shape Africa's revenue administration.

To set the highest possible academic and publishing standards from the onset, the AJCFS has put in place a stringent peer-review process in order to uphold the high quality of papers published in this journal and ensure that the reporting of research work is truthful and precise. After the proper review process, this inaugural issue is ready for publication with four research articles. The first article titled "*Structuring of tax administrations: evidence from OECD, emerging economies and selected African countries provides a comparative analysis of tax administration structures in OECD, emerging economies, and African countries*" concluding that hybrid models combining *functional and taxpayer segmentation approaches deliver optimal results. Secondly, article titled "Do Taxpayers Value Trust or Automation? Insight from Importance Performance Map Analysis for Compliance Reform" examines* the relationship between taxpayer trust and the adoption of automation, concluding that while automation enhances efficiency, trust remains critical for sustained voluntary compliance. The third article entitled "*Volatility of Importation and its Impact on Tax Revenue in Tanzania: A Time Series Analysis*" investigates the fiscal risks posed by fluctuating import volumes, finding that volatility undermines revenue predictability and calling for adaptive fiscal planning. Finally, last article entitled "The Role of Artificial Intelligence on Detecting Customs Fraud in Tanzania: Lessons from Leading Practice" highlights the transformative role of artificial intelligence in combating customs fraud, finding that AI-powered tools are more effective than traditional methods in detecting complex schemes.

Henceforth, on the occasion of the publication of this inaugural issue, I would like to thank all the people who had a vision to create African Journal of Customs and Fiscal Studies. In particular, I thank the Rector of the Institute of Tax Administration for inviting me to be the Editor-in-Chief of AJCFS. I also thank all the members of the editorial board for their willingness to serve the Journal in their respective capacities.

Finally, I thank all the authors who contributed their research to this inaugural issue. While feeling happy as this inaugural issue is brought out, I am aware that African Journal of Customs and Fiscal studies require commitment, not only from the publishers and editors but also from the reviewers and the manuscript contributors. The need for high-quality, context-specific research in customs and fiscal studies is more urgent than ever. As globalization, technological advancements, and evolving trade and business continue to reshape the African economic landscape, innovative, evidence-based solutions are essential. Hence, I want to encourage the authors to submit to AJCFS your research manuscripts, review articles as well as case studies and discussion in the field of Taxation, Customs and Fiscal policies that engage in Africa economies to address the real-world problems.

Prof. Omari Mbura
AJCFS Chief Editor

Structuring of Tax Administrations: Evidence from OECD, Emerging Economies and Selected African Countries

Isaya Jayambo Jairo1, Justin Musa2 and Joseph Chikongoye3

Abstract

This study employs both documentary review and field research to explore the organizational structures of tax administrations. We review the literature relating to thirty-four OECD and twenty-one non-OECD tax jurisdictions for a period from 2008 to 2025 to discern the best practices. We conduct desk research on five East African Community partner states' tax administrations and conduct benchmarking visits to four African countries. In Tanzania, we contact 700 respondents. We examine the degree of autonomy of tax administrations. A two-level approach to structuring a tax administration exists. Institutional arrangement and, organizational set up of a tax administration. We find that, from early 1990s to 2025, there has been a steady increase in the adoption of 'a unified semi-autonomous tax administration model from around 50% (2009) to 62% (2019) amongst OECD and non-OECD tax jurisdictions studied. The executive agency model appears to be the most preferred tax administration. On the other hand, the existence of less autonomous bodies with multiple directorates within the ministry of finance has decreased from 20% (2009) to about 10% (2019). As for the organizational set up of an executive agency body, there has been an evolution from departmentalization on the basis of tax type model first to one based on functions (around 2010), then towards a taxpayer segment model. There is a shift to a mix of functional and taxpayer segmentation. Mixing functional, taxpayer segment and tax type has resulted in a hybrid organizational set up. Few countries (Including Tanzania, South Africa and Uganda) have set up a High-Net-worth Individual unit within their structure to cater for the super-rich individuals who own large and multinational businesses. There is also an increase in the use of big-data analytics and automation, including artificial intelligence functions within tax administrations.

Key words: Tax administrations, emerging economies, and OECD countries

1. INTRODUCTION

In structuring their revenue administrations, most tax jurisdictions aim at improving administrative and operational efficiency in revenue collection. This efficiency is seen as a catalyst that will maximize government revenue that can be used to defray necessary

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public goods such as law and order, defense and the provision of utilities, infrastructure and social services like health, education, etc. This study's conjecture is that there are optimal characteristics of a tax administration's organizational structure that improves administrative efficiency in revenue collection, and that most tax jurisdictions' tax administrations would converge towards such a structure.

However, a closer look at these tax jurisdictions reveals marked differences in the structuring of their tax administrations. For example, in some jurisdictions such as Austria, Denmark, and the UK, customs functions are part of a tax administration while in others like Australia, Canada and the United States, they are not part of a tax administration function. Some tax administrations have structured their operations according to tax types, others according to functions (Kidd, 2010), and others (Austria and the USA) according to taxpayer segments (OECD, 2010; 2015). The existence of these differences raises curiosity about the rationale behind the structuring of tax administrations.

The operations and the organizational structure of tax administrations are key to the government reforms. A robust organizational structure is a foundation from which all procedural reforms are launched and maintained. In the absence of an efficient organizational structure, a tax administration cannot operate effectively neither can it collect adequate revenue. This study synthesizes the literature to explore the existing practices and traces the past trend to ascertain the current best practices as to whether there is a convergence towards optimal elements of a tax administration. The synthesis aims to provide guidance on how a jurisdiction can go about structuring its revenue administration. The study aims to identify the important elements of a tax administration organization's structure so as to provide a reference point for tax jurisdictions whenever there is a need for structuring or restructuring of tax administrations.

The second section reviews the relevant literature. The third section presents the methodology of the study and describes the data and data collection methods. The fourth section presents the findings. The fifth section discusses the findings. The sixth section concludes and gives recommendations for further research.

2. LITERATURE REVIEW

2.1. Structuring of Tax Administration: A two-level structuring

The literature reveals *a two-level structuring of tax administrations* (Mogoiu, 2017). The first level refers to whether a tax administration is directly within the government (within the Ministry of Finance) – e.g. Morocco, Korea, Ethiopia, The Netherlands, and Brazil, etc.

or is a unified semi-autonomous body with its own governing body (board of directors), for example United Kingdom, United States, Australia, Japan, and almost all East African community (EAC) partner states. In Ethiopia, the revenue authority is a ministry on its own. We refer to this level as 'Institutional Arrangements' (OECD, 2008, 2011). The second level of structuring a tax administration is the actual departmentalization within a tax administration. We call this second level 'Organizational set-up of a tax administration'.

2.2. *Institutional Arrangements:* Revenue Authority within the central government

The institutional arrangements manifest itself through several approaches. Variations include the following arrangements: (i) A revenue authority within the government (within the Ministry of Finance), (ii) A revenue authority a single directorate within the Ministry of Finance (examples include the *Belastingdienst* in the Netherlands- and *Ethiopian Ministry of Revenue (MoR)* in Ethiopia), (iii) Multiple departments/agencies directly under the Ministry of Finance (example in Tanzania, prior to the formation of TRA in 1996, the three departments (Income Tax Department, Customs and Excise Departments and the Sales Tax Department) were under the Ministry of Finance).

2.3. Institutional Arrangements a Unified Semi-Autonomous Revenue Authority

This refers to a case where a tax administration is a unified semi-autonomous entity hierarchically under the Ministry of Finance. This approach also has several variations such as hereunder:

i. A unified semi-autonomous entity reporting to government minister
ii. A unified semi-autonomous entity with an Advisory Board
iii. A unified semi-autonomous entity with a decision-making board of directors (BoD), where the CEO is subordinated to the BoD

Examples include the current structures of revenue authorities in Ghana, and the five countries within the East African community namely: Tanzania, Kenya, Uganda, Rwanda, Burundi, and the newly formed South Sudan Revenue Authority (SSRA).

2.4. Exceptional Arrangements

A few tax jurisdictions exhibit exceptions to the foregoing categorization. These include Switzerland where the responsibility for tax collection lies with the Cantons (member states of the Swiss confederation) on behalf of the Swiss federal government. In Italy, tax administration is spread across districts, which have different responsibilities. In

Germany, regional governments have collection responsibility while a rather small central tax administration has a high-level coordination responsibility (Mogoiu, 2017).

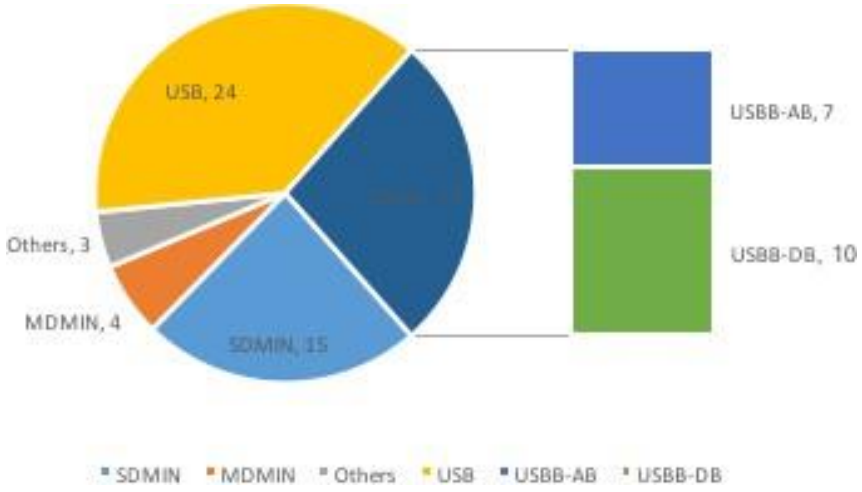
As it can be deduced from Table 1, the majority of tax administrations covered, 42 out of 64 (65.6%) have adopted a unified semi-autonomous tax administration operating out of the ministry of finance. Seventeen of which have a governing or advisory board overseeing the tax administration (USBB). Only 19 out of 64 (29%) of jurisdictions have adopted an *institutional arrangement* whereby a tax administration is either a single or multiple directorates within the Ministry of Finance.

Table 1: Grouping of OECD and other countries according to the categories of Institutional Arrangements

Unified Semi-Autonomous Revenue Authority (SARA)		**Unified Semi-Autonomous Revenue Authority (SARA)b with an oversight board**		**Single Directorate in the Ministry of Finance**	**Multiple Directorates in the Ministry of Finance**	**Other variations**
Australia	Japan	Argentina	Kenya	Austria	Belgium	China
Chile	Latvia	Bulgaria	Uganda	Brazil	Luxembourg	Denmark
Colombia	Lithuania	Canada	Rwanda	Costa Rica	Malta	Italy
Czech Republic	New Zealand	India	Burundi	Croatia	Poland	
Estonia	Norway	Malaysia	South Sudan	Cyprus		
Finland	Romania	Mexico	Ghana	France		
Greece	Russia	Peru		Hong Kong		
Hungary	Slovakia	Singapore		Indonesia		
Iceland	Slovenia	United Kingdom		Korea		
Ireland	South Africa	United States		Morocco		
Israel	Spain	Tanzania		Netherlands		
	Sweden			Portugal		
	Turkey			Switzerland		
				Ethiopia		
				Cameroon		

Source: Adapted from Mogoiu, Carmen, Mihaela (2017), P.22, EAC and other African countries added.

Figure 1: Institutional Arrangement



Source: *Constructed from Table 1*

Key:

SDMIN=Single Directorate within the Ministry of Finance

MDMIN=Multiple Directorates within the Ministry of Finance

USB=Unified Semi-Autonomous body reporting to government minister

USBB= Unified Semi-Autonomous body reporting to an Oversight Body/ Board

USBB-AB= Unified Semi-Autonomous body with an Advisory Board

USBB-DB= Unified Semi-Autonomous body with a Decision-making Board

Figure 1 depicts the distribution of institutional arrangements for 58 OECD and four selected non-OECD countries that were sampled in an OECD 2019 study. The majority of tax administrations (36 out of 58), 62% are unified semi-autonomous bodies. Out of the 36 with unified semi-autonomous bodies, 12 (33%) have either an advisory board or a decision-making board. To the contrary, only 34% of the total sample (i.e., 20 out of 58), are either a single department or multiple departments within the central government.

2.5. Organizational set-up of a Revenue Authority

Every organization has some kind of organizational structure to ensure the following: That its functions are divided to be done into specific jobs and departments; the jobs are grouped into different units; tasks are assigned and responsibilities are associated with individual jobs. The diverse organizational tasks need to be coordinated. The structure must establish relationships and lines of authority among individuals. For such an arrangement to work effectively there needs to be efficient allocation and deployment of organizational

resources. The arrangement of core functions of a revenue collection agency which are *Registration*, *Assessment, Verification* (Audit and Examination), *Collection* and *Dispute Resolution* as depicted in Figure 2

Figure 2: Overview of Core Tax Administration Functions

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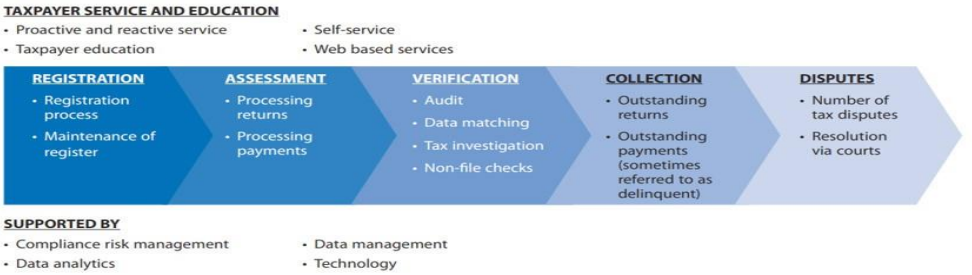

Source: OECD (2017), Tax Administration 2017: Comparative Information on OECD and Other Advanced and Emerging Economies https://doi.org/10.1787/tax_admin-2017-en.

2.5.1. Approaches in Structuring a Unified Semi-Autonomous Revenue Authority

Since early 1990s, history has witnessed organization structures of tax administrations evolving from those based on tax type, those based on function, and others based on taxpayer segment such as small, medium, or large taxpayers. Kidd (2010) reports that the organization structure has become a key component of an effective reform and modernization program. This section takes a historical approach to describe aspects of the organizational set-ups of national revenue bodies.

2.5.1.1. Tax type model

The earliest organizational model employed by tax administrators was based principally on the type of tax criterion. Under this model, separate multifunctional departments were responsible for each tax and were largely self-sufficient and independent of each other (OECD, 2009; Mogoiu, 2017). Examples include having separate Income Tax, Sales Tax units. This was the case in Tanzania before the establishment of the Tanzania Revenue Authority in 1996, where the Income Tax Department, The Sales Tax Department, the Customs and Excise Department were independent departments. Each department was working separately under their commissioners who were accountable directly to the Ministry of Finance (Mponguliana, 2005; Mpeho, 1983). As argued in (OECD, 2010), the tax type model had shortcomings, which included inconveniencing taxpayers with multiple tax dealings for having to deal with different departments on similar issues. There were complications, (both to revenue bodies and taxpayers), in managing and coordinating compliance actions across different taxes. Inherent duplication of functions, meant

inefficiency and higher costs. Separation of taxes increased the likelihood of inconsistent treatment of taxpayers. The arrangements impeded the flexible use of staff whose skills were largely confined to a particular tax. The model unnecessarily fragmented the management of the tax system, thus complicating organizational planning and co-ordination. Faced with these shortcomings, many revenue bodies decided to restructure their organizational arrangements, following a model based largely on 'functional criteria' would help to substantially improve overall operational performance (Kidd, 2010; OECD, 2010).

\2.5.1.2. Functional type

A function-based organization is one structured on the basis of the type of work performed, rather than the type of business or product or type of customer" (Kidd, 2010, p.2). Under the functional model, staff are organized principally by functional groupings (e.g. registration, accounting, information processing, audit, collection, appeals, etc.) and generally work across taxes. Examples include Mexico, Finnish and Israel's revenue authorities (OECD, 2010). Others include Brazil, Canada, India and Turkey (Kidd, 2010). The function type model to organizing tax administration permits greater standardization of work processes across taxes, thereby simplifying computerization and arrangements for taxpayers, and to generally improve operational efficiency (OECD, 2010). Its adoption has led to many developments aimed at improving tax administration performance. Examples of such developments include single points of access for tax inquiries, the development of a unified system of taxpayer registration, common approaches to tax payment and accounting, and more effective management of tax audit and debt collection functions. Standardized processes and policies may be designed and maintained and the related manuals and circulars produced alongside each function (Kidd, 2010).

However, a number of revenue bodies have taken the view that this model is not entirely appropriate for the delivery of compliance-related activities across different segments of taxpayers given their differing characteristics, behaviour and attitudes to tax compliance and risks that each taxpayer category poses (OECD, 2010). These arguments gave rise to other criteria for organizing a tax administration.

2.5.1.3. Taxpayer Segmentation

A more recent development in Australia and United States has been to organize service and enforcement functions principally around segments of taxpayers '(e.g. large businesses, small/medium businesses, individuals) (see OECD, 2010, 2015). The argument for organizing these functions around taxpayer segments is that each group of taxpayers has different characteristics and tax compliance behaviour and, as a result, presents different

risks to the revenue collection function. The management of these risks effectively, therefore calls for the tax administration to design and put into action strategies (e.g. law clarification, taxpayer education, improved service, more targeted audits) that are appropriate to the unique characteristics and compliance issues presented by each group of taxpayers.

Revenue bodies also need a structured approach to researching and understanding what these compliance issues are. Proponents of the taxpayer segment type of structure contend that grouping key functional activities within a unified and dedicated management structure increases the prospects of improving overall compliance levels. The United States' Internal Revenue Service is in favour of this approach. Its structure resembles the private sector model whereby the functions are organized around customers with similar needs; each of its primary operating divisions meets the needs of the specific taxpayer segment it serves.

(a) Large Taxpayer segment unit (LTU)

Majority of revenue bodies have established dedicated units – hereafter referred to as Large Taxpayer Units (LTUs)-to manage some/all aspects of the tax affairs of their largest taxpayers. This taxpayer segment present certain significant risks to effective tax administration. Revenue authorities have increasingly recognized that managing these risks requires strategies and approaches appropriate to the unique characteristics and compliance behaviour of these taxpayers (OECD, 2015).

According to OECD, 2013, the salient features of large taxpayers include concentration of revenue, complexity of their business and tax dealings, major tax compliance risks, use of professional/dedicated tax advice and status. In response to these factors, Revenue Authorities have established dedicated Large Taxpayer Units (LTUs) supported by highly skilled and expert staff. Across surveyed revenue bodies, these organizational units are likely to have different names and the scope and nature of their activities may vary but most have been established to improve the revenue body's capability to manage and improve the compliance of this important segment of taxpayers.

The Criteria for identifying taxpayers to be included in large taxpayer segment vary from different tax jurisdictions due to local factors and conditions. Common criteria include: (1) size of turnover, (2) size of assets, (3) aggregate amount of tax paid per annum across all taxes, (4) whether a business operate in certain business sectors (such as banking & financial institutions, insurance, mining, oil and gas or telecommunications), (5) significant international business activities and/or foreign control, (6) holding companies forming consolidated tax group, and (7) premier league football clubs (see OECD, 2013, 2015). Some tax jurisdictions (such as Ireland, South Africa and Tanzania) have placed the

administrations of High-Net-Worth Individuals (HNWI) under the control of their LTUs (OECD, 2008).

(b) High Net Worth Individuals (HNWI) unit

As mentioned earlier, this is one of the latest developments in organizing tax administrations. Tax administrations have come to realize that there are super rich individuals who are either owners or executives of large multinational business operations whose behavior is peculiar and therefore poses specific compliance risks. This taxpayer segmentation has attracted the interest of tax administrations for the following reasons:

i. The recognition that a small number of taxpayers are typically responsible for a disproportionate share of wealth and assets held within the economy. For example, the *World Wealth Report (Cap Gemini, 2016)* shows that Individuals with investible assets exceeding USD 1 million grew by 400% between 1996 and 2016. The same source reports that the wealth held by HNWI is likely to surpass USD 100 trillion by 2025.

ii. These taxpayers imply high compliance risk due to the huge volume of tax revenue at stake.

iii. This group of taxpayers is managed under the large taxpayer unit (LTU/LTD) because a large number of HNWIs are strongly connected with large businesses.

iv. In this group usually there is usually a possibility of mixing business and personal tax affairs

v. The group has resources and opportunity to undertake aggressive tax planning (OECD, 2015)

Due to these reasons, tax jurisdictions have established HNWI units within their structures to ensure provision of customized quality of service that is commensurate with status, their behaviour and characteristics. In many cases (Romania, Tanzania) they have a dedicated officer(s) managing one or a few HNWIs. These arrangements reduce the time needed for these taxpayers to comply. In this way, tax administration tends to understand better the tax issues of HNWIs, and is able to mitigate the risks posed by this taxpayer segments. The resulting benefits imply increased certainty and lower compliance costs. All these efforts aim to ensure that the HNWIs, however sophisticated and complex they are paying their fair share of tax.

(c) Medium taxpayer unit

This segment comprises of taxpayers whose size of operation and tax payments are fairly large but have not yet met the criteria for classification into ‘large taxpayers’ category. The

aim of providing special treatment here is to ensure close nurturing of medium taxpayers who have the potential to graduate to large taxpayers.

(d) Small taxpayer unit

This comprises of a very large group of small taxpayers each of whom pays an insignificant amount in relation to medium or large taxpayers. However, as a whole group they contribute a significant amount. It is therefore important to understand their compliance behavior and the related risks in order to be able to develop and implement appropriate enforcement measures to them in order to collect requisite taxes from them. The separation creates an opportunity for a tax administration to monitor and scrutinize closely the remaining small taxpayers who would not have otherwise received that closer look.

The small taxpayer segment comprises of taxpayers who normally lack tax education and awareness of their tax liability and obligation. The approach that needs to be adopted by tax authorities to this segmentation includes education campaigns and outreach programs to educate them on record keeping, filing of returns and their tax payment liabilities and simplifying payment procedures. In this way tax administration will be nurturing these small taxpayers on their way to grow their businesses and possibly becoming medium taxpayers.

2.5.1.4. Hybrid structure model

While tax jurisdictions endeavor to adopt 'taxpayer segments' in organizing their revenue body functions, in today's modern tax administrations the vestiges of functions model still remain. Currently, most revenue authorities exhibit a mix of all "functional", "taxpayer segment" and "tax type" criteria. The result is *a hybrid form of organization structure (OECD, 2015, p.60; OECD, 2017)*. Examples are not hard to find. Table 2 provides a list of 34 OECD jurisdictions that exhibits features of a hybrid tax administration structure. Typical revenue authorities have their domestic tax department divided into large taxpayers' unit (including High Net Worth Individuals), Medium taxpayer unit and small taxpayer units. This exhibits a taxpayer segmentation structure. These taxpayer segments are further sub-divided into audit and examination functions (a function model) and into a Value Added Tax (VAT) unit, connoting a tax type model.

Table 2 depicts grouping of some countries according to the main criterion of their organization structure. From the table it is evident that most world countries have adopted a hybrid (a combination) of the three models of organization structures. A significant number have adopted function criterion as their main type of organization structure. As discussed

in this section, very few revenue authorities exhibit pure 'tax type' structure and pure 'taxpayer segment' as their criterion for organizing their structure.

Table 2: Tax Administrations Organization Structures

Main Criterion of organizational structure of Tax Administrations					
Tax Type	**Function type**	**Taxpayer Segmentation**	**Hybrid/Mix of different types**		
Argentine	Brazil	Ireland	Australia	Hungary	Tanzania
Luxembourg	Bulgaria	South Africa	Austria	Iceland	Kenya
Switzerland	Canada		Belgium	Indonesia	Uganda
	Colombia		Chile	Israel	Rwanda
	Costa Rica		China	Italy	Burundi
	Estonia		Croatia	Japan	Ghana
	India		Cyprus	Korea	Norway
	Romania		Czech Republic	Latvia	Peru
	Slovakia		Denmark	Lithuania	Poland
	Sweden		Finland	Malaysia	Portugal
	Turkey		France	Malta	Russia
	New Zealand		Germany	Mexico	Singapore
			Greece	Morocco	Slovenia
			Hong Kong	Netherlands	Spain
			United Kingdom	United States	

***Source**: Adapted from OECD Tax Administration 2017: Comparative information on OECD and other advanced and emerging economies, pp. 76-77, EAC and other African Countries added.*

2.5.1.5. Other organizational structure aspects

(a) The Degree of Autonomy of a Tax Administration

From around 1990s, there has been a tendency for governments to increase the autonomy of its revenue departments and agencies. Autonomy can mean many things, including independence or even self-government, but in the context of public sector administration it usually refers to the degree to which a government department or agency is able to operate independently from government, in terms of legal form and status, funding and budget, and financial, human resources and administrative practices (Crandall, 2010, World Bank ,2019). The basic principle is that such autonomy can lead to better performance by removing impediments to effective and efficient management while maintaining appropriate accountability and transparency (World Bank (2019). Over half of the OECD

member countries have established semi-autonomous bodies (OECD, 2017). Most of the EAC partner states; Tanzania, Kenya, Uganda, Rwanda, Burundi, South Sudan have also established unified semi-autonomous bodies. These tax jurisdictions have interposed governing boards mainly to execute an oversight function and to have a role in strategy development, planning and approval business plans and strategies (OECD, 2013).

(b) Office Network and Allocation of Resources

Traditionally, European countries revenue bodies had a large number of regional and local office networks than in other countries (due to collection of real property taxes, and motor vehicle taxes). This network was geographical and hierarchical and was meant to carry out the full range of functions required for effective administration of tax laws. The rationale included the need to ensure accessibility of revenue body services to the citizens (OECD, 2011). Recently, most countries have embarked on a number of reforms to reduce the size and change the nature of their geographical network. Some countries have removed regional layer of management and streamlined lines of reporting (OECD, 2013). These reforms have been possible due to, *inter alia*, governments call for efficiency and cost reduction, technology changes driven by both organizing work and service delivery to taxpayers such as centralizing returns processing and payments, and call centers and a number of online services that enable taxpayers to register, file and pay online. The establishment of government one-stop-service centers providing tax related services has also contributed to scaling down of regional network (OECD, 2015). The practice of maintaining large headquarters operations (i.e. aggregate staffing in excess of 15% of total staffing) can be seen in countries across many continents has resulted in a more centralized approach to the national management of tax administration operations (OECD, 2008, 2015).

(c) Integration of Tax and Customs Administration

Most of the countries covered by this study have unified the collection of direct and indirect taxes. This includes the integration of tax and customs administrations into one unified tax administration (World Bank (2019). Actually, World Bank (2019) refers to this entity as an Integrated Revenue Authority (IRA). One such vivid example is the UK's amalgamation of its Inland Revenue and Customs and Excise departments into a single organization known as His Majesty's Revenue and Customs (HMRC) - that came into existence in April 2005 (OECD, 2009, p.18). The alignment of tax and customs administration within a single agency appears to have its origins in a number of factors. These include: *(1)* perceived synergies with customs operations that are responsible for the collection of VAT on imports, a major source of revenue in many developing countries; *(2)* historical factors associated with the separation of direct and indirect taxes administration; and *(3)* efforts to obtain

greater economies of scale (e.g. human resource and IT functions) World Bank (2005, 2019).

(d) Use of ICT and Big Data Analytics in Tax Administration

There has already been a significant shift towards e-administration with increasing options and uptake of online filing of tax returns as well as online payments. Digital contact channels (online, email, digital assistance) now dominate and the number of administrations using or developing mobile applications continues to grow (See PWC Tax Disruption Report 2021/2022). Electronic data from third parties, as well as internally generated electronic data is used in an increasingly joined-up way across tax administration functions for improving services and enhancing compliance. (OECD, 2019). The 'big data' so generated need to be understood, analyzed, and to be acted upon. For these to happen, the big data need to be captured, organized, stored and managed efficiently. This also shows in the large number of administrations that now employ data scientists (PWC Tax Disruption Report 2021/2022).

The emergence of advanced data analytics has brought about possibilities of using advanced technologies and intelligence in many functions of tax administration. There has been both the expansion of application of advanced data analytics as well as the broadening of the range of analytic techniques (and tools). The initial use of data analytics was mainly in selection of cases for audit, Currently, the scope has been broadened to include optimization of debt-management process, securing filing and payment compliance, improve taxpayer service and even for predicting the implications (or impact) of policy changes.

(e) Ethics and Integrity

There has been a growing trend in establishing dedicated units for monitoring and disposing of ethics and integrity cases in the unified semi-autonomous revenue bodies. In Tanzania, for example there is an Internal Affairs Department, which deals with promotion of ethical culture and ethical leadership within the Tanzania Revenue Authority. The department works proactively to prevent corruptive tendencies as well as reactively investigating fraud and corruption cases (World Bank, 2019).

(f) Tax Education and Tax Training

Most countries rely on tax revenue to build infrastructure, provide public services and fund government programmes, as such, it is crucial for tax administrations to ensure that taxpayers comply with tax laws. Education is a valuable tool that a tax administration can use to promote an understanding of tax law and the importance of taxes, which in

turn encourages compliance. Taxpayer education can foster a sense of commitment to the common good, thereby linking tax compliance to proper citizenship and collective responsibility. Across the world, tax administrations are developing various programmes and initiatives to engage both current and future taxpayers including adults, youth and children (OECD, 2019). The models used to educate the public include online, webinars, social media means such as YouTube, Twitter and Facebook. Revenue authorities have also found it beneficial to provide training to their staff. Tax administration has engaged in arrangements that include collaborating with universities and/or establishing their own colleges dedicated to tax training to their staff.

(g) Social security contributions

Social security contributions (SSCs) are now the largest single source of government taxa revenue in many OECD countries. These funds are primarily allocatedto specific government services (e.g. health, unemployment benefits and pensions). Governments have taken different paths as to the institutional arrangements used for their collection (IMF, 2009, p 18). Some OECD countries with separate social security regimes, the majority administer the collection of SSCs through a separate social security agency, rather than by the main tax revenue body. In others, the collection of SSCs has been integrated with tax collection operations. In most EAC countries, the activities and the collection of revenue from SSCs are not integrated with their tax administrations.

However, all these different structuring are just alternative ways of arranging the core functions of a tax administration which are *Registration*, *Assessment, Verification* (Audit and Examination), *Collection* and *Dispute Resolution*. The typical support functions of Human Resource and Administration, Finance, ICT, PR & Communication, Research, Education and Training, Risk Management, Procurement, Internal Audit that are common to most entities. The dispute resolution function is split into four stages. (1) The revenue authority handles tax objections submitted by taxpayers. If the aggrieved taxpayer is not satisfied by the final decision of the revenue authority, then the taxpayer may appeal to the (2) Tax Revenue Appeals Board (TRAB) and then to the (3) Tax Revenue Tribunal (TRAT). The final appellate authority for tax matters is the (4) Court of Appeal. Although these appellate authorities are part of the dispute resolution mechanism of the tax system, they are normally outside the revenue authority.

3. METHODOLOGY

3.1. Sample of Countries Covered

The study reviewed relevant literature from thirty-four (34) OECD and twenty-one (21) non-OECD tax jurisdictions for a seventeen-year period (from 2008 to 2025). Desk research was conducted on all East African Community tax administrations (before DRC joined the EAC): i.e. Tanzania Revenue Authority (TRA), Kenya Revenue Authority (KRA), Uganda Revenue Authority (URA), Rwanda Revenue Authority (RRA), *Office Burundais des Recettes* (OBR), South Sudan Revenue Authority (SSRA formerly called National Revenue Authority-NRA) and Zambia Revenue Authority from 2020 to 2025.

3.2. Data and field data collection

The field research was within the United Republic of Tanzania including Zanzibar), involved administration of questionnaires, interviews and focus group discussions. The sample involving six hundred eighty-seven (687) respondents in 16 regions, 152 Questionnaires, 167 FGDs, and 368 interviewees. This was conducted between 2020 and 2025. In total therefore, the number of respondents in this study was about seven hundred (700).

Furthermore, benchmarking visits were carried out between 2022 and 2025 in five countries namely, Kenya (KRA), Ethiopia (*Ethiopian Ministry of Revenue (MoR),* Ghana (GRA), the Republic of South Sudan (SSRA) whose revenue authority by then was known as the National Revenue Authority (NRA) and the United Republic of Tanzania.

3.3. Methodological Approach

The data collected from OECD publications between 2008 and 2019. The number of tax administrations studied for those years were as indicated in table 3.

Table 3: The number of tax administrations studies for the period 2009 to 2019

S/N	Year	Number of Tax Administrations	
		(Institutional Arrangement)	Organizational Set-up)
1	2009	43	43
2	2011	49	49
3	2013	52	52
4	2015	56	56
5	2019	58	58

Source: *Constructed from OECD, (2009, 2011, 2013, 2015 and 2019)*

For each of the 58 OECD tax administrations, the two-level structure was studied for each year (see section 2.1). Under level one, "Institutional Arrangement", several aspects were studied for any given year and was tabulated. These included (i) Whether a tax administration is a unified semi-autonomous agency; (ii) whether a tax administration has a formal Board of Directors; (iii) whether a tax administration is a less autonomous single directorate within the Ministry of Finance; (iv) whether a tax administration fall under multiple directorates within the Ministry of Finance. The study also analyzed as to whether a tax administration separated direct from indirect tax administration.

As for the Organizational set-up level, the analysis first looked at the degree of autonomy of a tax administration. Four proxies for the degree of autonomy were generated (i.e. independence in the design of internal structure; Budget allocation discretion; decision on the levels and mix of staff; and the ability to influence and to negotiate staff remuneration). Secondly, the basis of departmentalization was analyzed. Here the study tabulated as to whether the tax administration was set-up based on tax type, function, taxpayer segmentation, or a hybrid basis. Other aspects that were scrutinized include whether customs function was integrated in the unified semi-autonomous revenue authority; whether a dedicated data processing unit exists; and whether or not the tax administration combines the functions of social security contributions. The practices were established for the period of ten years.

4.0. PRESENTATION OF FINDINGS

4.1. The Research Problem Revisited

This study employed both documentary review and field research to explore the way revenue administrations are structured worldwide. Benchmarking studies were also physically carried out in a number of African countries. The quest was to find out how to structure/ restructure a revenue administration so that it can carry out its operations efficiently and be effective in collection of government revenue. The findings of the study would then provide guidance on how a given country can go about structuring or restructuring its revenue administration in a bid to be able to operate optimally. The theory advanced here was that there is an optimal organizational structure to which the tax administrations strive to converge.

4.2. Findings from Literature Review

Table 4 shows the results of more than 50 OECD and four non-OECD countries that were surveyed for a period between 2008 and 2019.

***Table 4**: Institutional Arrangement*

		2009	2011	2013	2015	2019	Remarks
Institutional Arrangement	Unified semi-autonomous	24 (56%)	28 (57%)	31 (59%)	33 (60%)	36 (62%)	Increasingly adopted
	Bodies with Formal Board of Directors	8	10	11	11	12	Increasingly adopted
	Less Autonomous – single directorate	9	10	9	12	14	Practiced but less than USB
	Less Autonomous – multiple directorates	9	10	9	7	6	Decreasing trend
	Separate direct and indirect tax admin.	4	5	5	2		Decreasing trend
Total		43	49	52	56	58	

***Source**: Constructed from OECD, (2009, 2011, 2013, 2015 and 2019)*

4.2.1. Observed trend on institutional arrangement

From table 4 it is evident that over the period from 2008 to 2025 of this study there has been a steady increase in the adoption of 'a unified semi-autonomous tax administration model' (a semi-autonomous revenue authority-SARA) from around 50% (2009) to 62% (2019) amongst OECD tax jurisdictions studied. On the other hand, the existence of less autonomous bodies with multiple directorates within the ministry of finance has decreased from about 9 out of 43, i.e. 20% (2009) to about 6 out of 58, i.e. 10% (2019). The use of oversight and/or advisory boards over the unified semi-autonomous tax administrations has also risen from 8 out of 43, i.e. around 18% (2009) to 12 out of 58, i.e. more than 20% (2019).

4.2.2. Observed trend on Organizational Set-up

From table 5 it is evident that in 2009, on average nine out of forty-three OECD tax jurisdictions studied, (only 9%) of the tax administrations had a substantial degree of autonomy from the government. By 2019, on average fifty-two out of 58 (89.6%) OECD tax jurisdictions studied, enjoyed a higher degree of autonomy in the design of their internal structure, budget allocation discretion, determining the levels of staff mix and in influencing or negotiating staff remuneration.

Other interesting observations from table 4 are not hard to find: The tax type model of structuring tax administrations is becoming unpopular while the function type structure is predominantly used. Taxpayer segmentation structure is increasingly used. There is also

an increasingly use of large, medium and small taxpayer segments to structure operations. These developments can be corroborated with what is actually happening on the ground. High net worth Individual (HNWI) units have just started to be established (e.g. in Tanzania, Uganda, Kenya, South Africa). In 2024, TRA increased the degree of autonomy when the government allowed the tax administration to carry out recruitment of staff independently without the involvement of the central government. The Hybrid model or a mix of taxpayer segmentation and function type in organizing tax administration operations, and vestiges of tax type and functional models can also be seen from table 5.

4.2.3. Inclusion of customs functions in tax administration:

Over the 2009 to 2019 period, on average 34% of the OECD tax jurisdictions studied, included customs operations in their tax administration. Other features observed over the period include dedicated data processing units. On average about 80% of the OECD tax jurisdictions studied had a dedicated data processing unit. Close to 40% of the OECD tax jurisdictions studied had social security contributions integrated with tax collections within their tax administrations.

Table 5: *Organizational Set-up*

		2009	2011	2013	2015	2019	Remarks
Degree of Autonomy	To design the internal structure	7	11	16	16	50	Autonomy increasing
	Budget allocation discretion	7	9	11	14	43	Autonomy increasing
	Levels and staff mix	9	13	16	16	57	Autonomy increasing
	Influence/negotiate staff remuneration	13	18	23	28	57	Autonomy increasing
Organizational set up	Tax type	N/A	N/A	N/A	N/A	N/A	No longer practiced
	Function	12	13	14	12	N/A	Still practiced
	Mix of the three	24	30	35	38 (68%)	N/A	Increasingly adopted
	Large Taxpayer	33	38	44	48 (86%)	N/A	Increasingly adopted
	Inclusion of Customs	15	13	18	19	N/A	Increasingly adopted
	Dedicated data processing unit	36	38	42	43	N/A	Increasingly adopted
	Integrated SSC	19	N/A	19	20	N/A	
	Separate SSC	21	N/A	23	34	N/A	
Total		43	49	52	56	58	

Source*: Constructed from OECD, (2008, 2011, 2013, 2015, 2019 and, 2020)*

5.0. DISCUSSION AND ANALYSIS OF THE FINDINGS

5.1. Adoption of a unified semi-autonomous tax administration:

As it can be deduced from both table 4 and Figure 1, the majority of tax administrations covered have i.e. 36 out of 58 (62%) have adopted a unified semi-autonomous tax administration (USB) operating out of the ministry of finance. Twelve of which have a governing or advisory board overseeing the tax administration (USBB). Only 34.4% of jurisdictions have adopted an *institutional arrangement* whereby a tax administration is either a single or multiple directorates within the ministry of finance. The practice of establishing a separate semi-autonomous body for tax administration covering all taxes (and sometimes customs) appears to be optimal. Having a revenue authority removed from the formal internal structure of the Ministry of Finance mirrors a broader development in public sector administration sometimes described as the "executive agency" model. The model, in a revenue administration context often referred to as the "revenue authority model".

5.2. Benefits of semi-autonomous revenue authority (SARA) Model

Firstly, a unified tax administration enables its management (and indirectly the government) to see a 360-degrees view of the tax administration operations. This also enables a tax administration to tackle pertinent challenges of taxpayer registration, compliance risk, enforcement, and information systems and data analytics in an integrated fashion. Secondly, autonomy it improves efficiency because its operations are not burdened by government bureaucracy (World Bank, 2019).

The executive agency model is considered an edge above other models due to the following reasons: 1) as a single-purpose agency, it can focus its efforts on the single task; 2) as a semi-autonomous organization, it can manage its affairs professionally, free from political interference. In addition, 3) freed from the constraints of the civil service system, it can recruit, retain (or dismiss) and motivate staff to a higher level of performance. See (Taliercio, 2004; Kidd and Crandall,2006; and Mann, 2004). The rationale for having an autonomous revenue authority is also provided by the World Bank Group's Handbook for Tax Simplification as follows:

"Performance, once it is properly defined and adequately measured, requires management flexibility to allow the Tax Administration (TA) to focus on achieving its goals and to link incentives to performance delivery. This implies that senior TA officials should have the freedom to choose an appropriate organizational structure and assign responsibilities

to the organizational units. Furthermore, managers should have the freedom to acquire and deploy physical resources and the manpower necessary to carry out their assigned responsibilities effectively, subject only to external oversight to ensure no malfeasance or abuse of powers." (James, 2009).

5.3. The Successful case of a semi-autonomous revenue authority (SARA) model:

The case of Peru's National Tax Administration Superintendence (SUNAT) provides a good example of the benefits of a Semi-Autonomous Revenue Authority (SARA) model. Before 1988, SUNAT was riddled with corruption, lacked experienced professional staff and never trained its staff. It was inefficient, ineffective and on the verge of collapsing, tax revenue collection had fallen from 14% of the GDP in 1978 to 9% in 1988. Backed by legal framework and by the country's President, SUNAT was separated from the Ministry of Finance, given autonomy modelled on that of a central Bank. Independent from the civil service regulations, with SUNAT CEO being an appointee of the President and reporting to the President, and retaining 2% of collections, by 1997 collections recovered to 13% of the GDP (See World Bank, 2019, pp. 13-14).

6.0. CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The study was about structuring of a revenue administration. The study systemized the structuring of tax administrations. Both documentary review and field research were employed. Benchmarking visits were also made to five African countries in a bid to find out an optimal organizational structure of a tax administration. The theory behind this study was that there is an optimal organizational structure to which most (if not all) organizational structure of tax administrations will converge towards.

6.2. Two-level structuring

The surveyed literature indicated that structuring a tax administration is a two-stage exercise. Institutional Arrangement level and Organizational set-up level.

6.2.1. Institutional Arrangement

The first stage being that of determining what the literature refers to as Institutional Arrangement. Institutional Arrangement implies to whether a tax administration is within the ministry of finance (either a single directorate or multiple directorates) or is a unified semi-autonomous agency outside the ministry of finance but reporting to the minister.

Sometimes this unified semi-autonomous agency has an advisory board. The Benchmarking studies revealed that most OECD and non-OECD countries, almost all EAC and some African countries, have adopted a unified semi-autonomous agency outside the ministry of finance. The second stage refers to how the tax administration is divided into departments, divisions, units and sections

6.2.2. Organizational set-up

This is the actual departmentalization within a tax administration. The major differences between a tax administration and other entities are the presence of core functions of revenue/tax collection departments within a tax administration. The historical trend has shown a gradual change of how the core operational departments are set up from tax type through function-based structure, and later to taxpayer segmentation structure.

6.3. Findings

The current trend indicates that in many countries there is a tendency of removing a tax administration from the ministry of finance and forming a semi-autonomous body corporate with its own governing body. This has been termed as the *executive agency model*. To formalize the mandate of this executive agency, the law establishes this body corporate. The governing body and the Chief Executive Officer of this body corporate, in most cases known as the Commissioner General (CG), then reports to the Ministry of Finance. For a number of years, this body corporate has been known as a Revenue Authority (Tanzania, Kenya, Uganda, Rwanda, Burundi and Ghana), In some countries it is known as a Revenue Service (South Africa, Botswana), or a Revenue Board (Zanzibar, up to 2024). This model is known as a 'revenue authority model'.

As for the organizational set up of this executive agency body, over the past three decades there has been an evolution from tax type model first to an organization structure based on functions (See Kidd, Maureen (2010), then towards a taxpayer segment model. The latest trend has been the emergence of hybrid setups to a mix of functional, taxpayer segment and (more recently) medium and small taxpayers are concerned. Mixing functional, taxpayer segment and tax type has resulted into a hybrid organizational set up. A few countries (Including Tanzania, South Africa and Uganda) have set up a High Net worth Individual (HNWI) unit to cater for the super-rich individuals who own large and multinationals businesses.

6.3.1. Taxpayer segmentation

6.3.1.1. Large Taxpayers Operations and High Net Worth Individuals:

Tax jurisdictions have recognized that managing taxpayer compliance risks requires a 'sharpened targeting of risks' strategies and approaches appropriate to the unique characteristics and compliance behaviour of different segments of taxpayers (OECD 2006, OECD 2008, OECD 2011, OECD 2013, and OECD 2015).

In response, tax administrations have established dedicated Large Taxpayer Units (LTUs), albeit with different names and scope. High-Net-Worth Individual (HNWI) are placed under the control of their LTUs. Tanzania established the large Taxpayer Department in 2001, and medium taxpayer and small taxpayer divisions within the domestic revenue department in 2023 and a High-Net-worth Individuals (HNWI) in 2024. On the other hand, Ghana has a large taxpayer unit (LTU) headed by a Deputy Commissioner under the Domestic Revenue Department. Kenya and Uganda have centralized medium taxpayer units while Zambia has adopted decentralized medium taxpayer offices in the provinces.

6.3.1.2. Medium Taxpayers

Medium taxpayer segments cater for taxpayers whose size of operation and tax payments are between large and small taxpayers. The segmentation provides special treatment by nurturing these taxpayers so that they can graduate into large taxpayers.

6.3.1.3. Small Taxpayers

This segment consists of a myriad of small taxpayers each one of them contributes a relatively insignificant amount of tax. This is an omnibus group consisting of taxpayers who keeps proper accounting records, can afford to employ accountants and tax consultants, and those that do not. As a group however, they contribute a significant amount. Given their compliance behavior and the related risks, it is important to treat them separately as it gives the tax administration opportunity to to monitor and scrutinize their tax affairs.

Since they lack tax education and awareness of their tax liability and obligation, tax administration can design outreach programs to educate them on compliance requirements. The segment needs to be nurtured so that they may grow and graduate to higher level.

6.4. Core Tax administration functions

From literature, benchmarking visits and field research, the prevailing practice is the adoption of a hybrid organizational structure that combines elements of both the functional

model and taxpayer segmentation. This manifests itself into dividing domestic revenue into large, medium and small taxpayer segments. Some tax administrations have now embarked on establishing a High-Net-Worth Individuals (HNWI) units. Another important aspect of structuring a tax administration is the decision of the size and geographical network across the country. Further considerations include how a large or a medium taxpayer is set up. Whether the function is centralized or has zonal or regional network.

6.5. Traditional Support functions

Naturally, a tax administration will have typical support department such as HR and Administration, Finance, ICT, Internal Audit, Legal, Risk Management and Compliance, and Data Analytics.

6.5.1. Non-traditional support functions:

In the recent past, tax administrations have adopted some non-traditional support functions that are not found in other entities. These support functions are special to tax administrations. These include Taxpayer education and communication. Internal Affairs (to oversee ethics and integrity), Research and Policy and even training colleges or academies.

6.6. Emerging Issues in Structuring a Tax administration

From early 1990s, the use of advanced ICT systems in collection of revenue has become a mandatory process. Not only automation increases the speed of execution of business processes, it also enhances accuracy by getting rid of human errors due to fatigue and personal bias.

6.7. How should Tax administrations react to the Disruptive technologies?

Currently, in 2025, these disruptive technologies have reached their maturation. A disruptive technology is *"a technology that provides such radical solutions to existing inefficiencies in a particular ecosystem that it comparatively rapidly displaces established technologies* (OECD, 2019). These advanced technologies have brought about fundamental shifts in society. From automation of production and supply, enhanced communication systems, use of smart technologies, the internet of things (IoT), Artificial intelligence (AI), Machine learning, Blockchain technology and the related cryptocurrencies.

On the other hand, the huge data sets generated and received by tax administrations from taxpayers, real time systems, and supply chain, third parties, and even international exchanges need to be understood, to be analyzed, in order to inform decision. For these to

happen, advanced big data analytics, must be applied. Tax authorities cannot work outside the disruptive technologies that are currently impacting the society and the economy. As an institution playing a key role in the society and the economy, tax administrations are not expected to stand aside and watch these advancements in technology from afar. Rather tax administrations need to adopt, adapt and be at the center of these disruptive technologies. The successful adoption of these disruptive technologies will shape the future success of tax administrations in managing compliance risks and also in meeting service demands (OECD, 2016).

6.8. Transformations needed by tax administrations

Tax administrations need to anticipate the nature of transformation that they will have to embrace. They need to study the disruptive technologies to understand their manifestations and how they impact the economy and the society at large. Experts must research in order to discern how these technologies will affect tax administrations so that both administrations and governments can prepare in advance. One such areas is the recruitment, developing and deployment of new skills that relate to new occupations to man data analytics and data mining areas. Data scientists, data architects, data analysts, machine learning engineers, and business intelligence specialists will be needed. Data analytics tools and organizational issues will also need preparations.

6.9. Areas for further research

In OECD countries covered in this study, social security contributions are integrated into tax administration and are even considered part of revenue collected by revenue collection bodies. In non-OECD and developing countries social security contributions are collected by separate entities from revenue authorities. It may be interesting to explore the reasons behind this observation.

The significance and contribution of special units with specific skills, offering operational economies of scale in revenue authorities (e.g. Data analytics and data mining, economic intelligence, risk management, artificial intelligence, etc) have not yet been explored in most developing countries. With the maturation of disruptive technologies, it may be interesting to explore how the establishment of these special units and how adoption of advanced technologies in revenue authorities can enhance revenue collection.

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Do Taxpayers Value Trust or Automation? Insight from Importance Performance Map Analysis for Compliance Reform in Tanzania

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Abstract:

This study evaluates key aspects of trust and e-filing quality factors on e-filing system use and compliance burden reduction in Tanzania for guiding managerial decisions and actions for improvement. The study employed a cross-sectional design and it was conducted in Dar es Salaam. Data were collected from a sample of 410 private business entities under large taxpayers' and domestic revenue department engaged in filing return through the e-filing system. Employing the Importance-Performance Map Analysis (IPMA), the study identifies trust as the most influential factor in e-filing use, followed by system quality. Findings suggest that while taxpayers positively perceive the system's efficiency, concerns over data security, system reliability, and service standardization persist. The study recommends that tax agencies need to focus on enhancing taxpayer's trust through improved transparency, reliable system access, and consistent service delivery. These insights provide actionable recommendations for optimizing e-filing systems to improve tax compliance outcomes.

Keywords: e-filing system, tax compliance burden, trust, Importance-Performance Map Analysis (IPMA).

1. Introduction

Automation of the tax administration is considered as a critical strategy for improving efficiency, transparency and compliance. Automation streamlines tax procedures, limit direct interaction with tax officials, thereby reducing the time taken by taxpayers to process returns and payments (Chindengwike, 2022; Irefe-Esema & Akinmade, 2020; Lazos et al., 2022; Madegwa et al., 2018; Okunogbe & Pouliquen, 2017, 2022; World Bank, 2016). Recognizing these benefits, governments have automated tax administration process to provide seamless filing of returns and payment of tax dues (WorldBank, 2016). Taxpayers in Tanzania have historically faced challenges in meeting their tax obligations under the manual tax system, which increased the compliance burden (Awai & Oboh, 2020; Umenweke & Ifediora, 2016).

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To address this burden, the Tanzania Revenue Authority (TRA) has implemented reforms and initiatives aimed at improving voluntary compliance and reducing compliance costs. One such initiative is the establishment of the Integrated Domestic Revenue Administration System (IDRAS) (TRA, 2024). The first phase of digitalizing return filing involved the Value Added Tax (VAT) return introduced in 2010 ("URT" The Finance Act" 2009). Ten years later (i.e. October 2020), the scope widened to include income-related tax returns, and was announced as mandatory by the law ("URT - The Finance Act," 2022). However, effectiveness of these system reforms depends on taxpayers' trust on the tax agency.

Trust in tax authority is a key aspect influencing taxpayer's willingness to comply with the e-filing system (AbuAkel & Ibrahim, 2022; Ismail et al., 2021; Simorangkir & Fakhrorazi, 2023). Trust revolves around belief of the capability and privacy of the system (AbuAkel & Ibrahim, 2022; Ismail et al., 2021). However, study indicated Africans have low trust with their government (ATAF, 2024). Thus, TRA has incorporated trust building measures emanating from TRA vison (TRA, 2023, 2024). The Vision aims at positioning TRA as Trusted Revenue administration and a mission statement indicates the embracement of technology to achieve taxpayers' compliance (TRA, 2023, 2024). Though operational excellency, taxpayer's engagement, automation and innovation while demonstrating high level of integrity, accountability, professionalism and trustworthy (TRA, 2023) in all engagement with taxpayers.

Despite these achievement, taxpayers' trust in government e-services is still a challenge in developing countries (ATAF, 2024). Previous studies (ATAF, 2024; Kimea et al., 2019; Masunga et al., 2020; Sichone et al., 2017) have primarily focused on taxpayer acceptance, intention to use e-filing, and compliance behaviour. This study aims to provide tax agencies with important and high-performing, taxpayer-valued factors to enhance e-filing usage and streamline tax compliance using the Importance Performance Map (IPM) Analysis.

The rest of this paper is organised in the following sections: section 2 provides theoretical and empirical literature review; section 3 describes the methodology employed on the analysis of this study; section 4 presents the results of the study; section 5 discussion of the study findings and finally section 6 provide consultations and recommendations on practical, limitation of the study and consideration for future studies.

2. Literature Review

2.1. Theoretical Literature Review

The study based on the Delone & McLone Model (2003), it is widely used in evaluating the success of information system. The model comprised of six dimensions; system quality, service quality, information quality, user satisfaction, system use and organization benefit. This theorizes influences users' system use and user satisfaction, thereafter system use provides net benefit to the organization. In this study, the focus was on the use of the system, hence user satisfaction construct was dropped and organization benefit is conceptualized as reduction of tax compliance burden. The study complements the Delone & McLone model with the trust construct, trust plays a critical role in influencing system users perception on the usefulness and ease of use of the system (Yao et al., 2024). This combination allows a comprehensive evaluation of how trust and system quality factors influence e-filing usage and reduction in tax compliance burden.

2.2. Empirical Literature Review

2.2.1. Trust in Government Institution

Several studies indicate trust in the government is a key component for taxpayers' usage of the tax system (Alomari *et al*., 2012b; Vincent, 2021). Trusting the e-filing system means taxpayers believe that the tax authority are responsive, and dependable and show understanding to taxpayers when interacting with the system and creates public value in the e-filing (Abdulkareem & Mohd Ramli, 2022), confidence of taxpayers (Putra et al., 2022), and stronger direct taxpayers royalty on the e-government (Alkraiji & Ameen, 2022; Alomari et al. (2012a).

Further, trust in the organisation significantly influence work engagement (Ugwu et al., 2014; Angelina et al., 201), perceived usefulness of e-filing (Munisi et al., 2024). In this regard, an increase in the taxpayers' trust on the strength of the tax system security and privacy strongly and significantly enhances taxpayers' belief in the system quality factors and enhance engagement with the tax system.

2.2.2. Automated Tax Administration System Quality Factors

Information Quality

When there is high level of quality information, its users gain more experience with the system and low-level causes inconveniences and higher information processing

costs (Veeramootoo *et al*., 2018). Information quality was found insignificant in influencing usage of the system, such as medical emergency systems (Petter & Fruhling, 2011) and e-filing systems (Milamo & Magobe, 2024; Veeramootoo *et al*., 2018). Frequent users of the system such as Gen Z individual taxpayers (Kaban et al., 2023), digital library systems (Alzahrani *et al*., 2019), e-government (Teo *et al*., 2008), university information systems (Dalle *et al*., 2020) were significantly influenced by information quality.

Furthermore, logistic system in a medical centre (Wei 2018), the education system (Tahu & Yuesti, 2021) as well as tax compliance intention (Saptono *et al*., 2023) and e-invoicing (Wagiman et al., 2023) were influenced by information quality. Thus, significance of the information on automated system is influenced by several factors such as required or voluntary usage, trust on the organization and frequency of the use. However, the e-filing system is new, hence, information quality is considered relevant to building taxpayers' competence in using the system.

Tax Service Quality

Service quality is key component in building taxpayers' experience that will influence taxpayers trust with the tax agency. Service quality involves competence, follow-up service, empathy, reliability, and responsiveness (Alzahrani, Mahmud, Ramayah, Alfarraj, & Alalwan, 2019). The measurement criterion included reliability, assurance, empathy, security, protection of privacy, individual attention, and responsiveness (Akram et al., 2019; DeLone & McLean, 2003). The system which meets these service quality criteria is said to satisfy the user's needs and can exert a greater influence on their usage of the e-filing tax system (Ramdhony *et al*., 2023).

Recent studies on university information systems (Dalle *et al*., 2020), the education system (Tahu & Yuesti, 2021), the health sector Cho *et al*. (2015), the logistic system in a medical centre (Wei *et al*., 2017), and hospital emergency services (Petter & Fruhling, 2011) indicated significance of the service quality of system use. In tax related environment studies on e-filing include Veeramootoo *et al*. (2018), e-invoicing by Wagiman et al. (2023), and Gen Z by Kaban et al. (2023) shown insignificant influence of prompt services on system usage. Lee and Lee (2021) and Oji (2017) indicated that where there is required use of the system service quality becomes a key element while in voluntary usage; service is used as a selection criterion. Given that the use of e-filing in meeting taxpayers' obligations is mandatory it is reasonable to conceptualise the high importance of support services from the tax administrators to ensure efficiency and effective usage of the system.

Tax System Quality

System quality refers to the extent to which the system is reliable and easily used with minimal encounter of problems (Albay, 2020). The construct demonstrated a significant influence on the usage (Alzahrani et al., 2019; Cho et al., 2015; Dalle et al., 2020; Kaban et al., 2023; Milamo & Magobe, 2024; Ojo, 2017; Petter & Fruhling, 2011; Veeramootoo et al., 2018; Wagiman et al., 2023; Wei et al., 2017). In contrast, studies conducted on open source enterprise information system development in the USA (Lee & Lee, 2012) and e-commerce success (Angelina *et al*., 2019) found otherwise and explained that insignificance is due to a lack of trust and mandatory usage. In the case of the e-filing system, the construct was found to be significant; the result is explained by taxpayers' interest in submitting their returns effectively and timely(Jumanne & Mrindoko, 2022), and increase in compliance (Munisi et al., 2024).

The task depends on the quality of the system (Veeramootoo *et al*., 2018) and the compulsory nature of it (Teo *et al*., 2008). Meanwhile, some studies observed inconsistent results in e-filing that tax system quality insignificantly influence compliance (Masunga et al., 2020). Hence, a low level of system quality discourages end users' engagement with the system (Al-Mamary, 2019).

Tax System Usage

System use is a psychological state where people show their willingness to invest their energy in a task (Kahn, 1990; Maslach *et al*., 2001). Thus, taxpayers' perception of the benefit and performance of the tax system increases their willingness to use it (Kimea *et al*., 2019; Sichone, 2017). However, when the amounts of resources utilized for compliance are excessively high, then, it becomes a burden to taxpayers and business performance (Abdul Mansor & Mohd Hanefah, 2008; Matarirano *et al*., 2019).

Several studies found an insignificant influence of system use on net benefits or organisation impact (Aditya et al., 2020; Al-Mamary, 2019; Angelina et al., 2019; Cho et al., 2015; Garomssa et al., 2021; Lee & Lee, 2012). The result may be explained by the mandatory nature (Lee & Lee, 2012; Petter & Fruhling, 2011), non-frequent usage, and not perceiving the benefit of the system (Angelina et al., 2019) and new system (Cho, *et al*., 2015). However, studies conducted in the education sector such as digital library systems (Alzahrani *et al*., 2019), university information systems (Dalle et al., 2020) as well as a logistic system in medical centres (Wei et al., 2017), e-invoicing in VAT (Wagiman et al., 2023) found a significant influence of system engagement on organisation impact or net benefit. Furthermore, a study on impact evaluation of the e-filing indicated that e-filing

reduces the cost in terms of time in preparation of monthly returns and payment (Okunogbe & Pouliquen, 2017, 2022). Safety, reliability, and accuracy perception contribute to users reliance on the system to achieve their desired results (Dalle *et al*., 2020).

3. Methodology

3.1. Sampling Criteria and Sample Size

The research employed a cross-sectional design. It was conducted in Dar es Salaam metropolitan city that comprises the largest business hub of the country, contributing more than 80% of the total revenue collection (Research and Innovation Managers, Personal Communication November 11, 2022) and the highest Domestic Growth Product (GDP) (Todd *et al*., 2019). The sampling frame consisted active taxpayers registered in Dar es Salaam metropolitan with TRA, from Large Taxpayers Department, Kinondoni Tax Region, Ilala Tax Region, and Tegeta Tax Region. Probability sampling procedure was considered appropriate (Acharya *et al*., 2013).

Moreover, the study applied the following formulae to arrive at minimum sample size of 410 : (Kock & Hadaya, 2018; Sarstedt et al., 2021)

Where: n_{min} = Minimum Sample Size, p_{min} = Minimum path coefficient, and Numerator values depend on the critical ration.

3.2. Data Analysis

The data analysis involved both descriptive and inferential techniques using IBM SPSS Statistics 25 and Smart PLS. Descriptive statistics summarized respondents' characteristics and responses using frequencies and percentages, with constructs measured on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The normality of data distribution was assessed using skewness and kurtosis. While PLS-SEM does not strictly require normality, values falling within ±2 (Garson, 2012) and ±3 (Farooq, 2016) were deemed acceptable for interpretability. To address potential common method bias, Harman's single-factor test was applied, ensuring that no single factor accounted for more than 50% of the total variance (Podsakoff, 1986; Rajapathirana & Hui, 2018). Additionally, procedural remedies such as anonymity and confidentiality were employed to mitigate bias (Podsakoff et al., 2003).

Reliability and validity tests ensured the measurement quality of the constructs. Internal consistency was assessed using Cronbach's alpha and composite reliability, with indicator loadings between 0.70 and 0.90 considered acceptable (Ali et al., 2018; Hair, 2019).

Validity was evaluated through face, content, and criterion validity. Convergent validity was confirmed through Average Variance Extracted (AVE), with thresholds set at 0.50 or higher (Hair et al., 2019; 2021). Discriminant validity was assessed using the heterotrait–monotrait ratio (HTMT), where values above 0.85 for distinct constructs and 0.90 for conceptually similar ones indicated a validity concern (Henseler et al., 2015). Furthermore, the study utilized the Importance Performance Map (IPM) in Smart PLS to evaluate the relative importance and performance of constructs related to e-filing system usage and tax compliance burden. This approach, based on total effects and latent variable scores, supports evidence-based managerial decision-making (Hair Jr et al., 2023; Hauff et al., 2024)

4. Discussion of the Findings

4.1. Descriptive Characteristics of Respondents

The analysis in Table 1 in appendix 1 discloses that 12 percent of the sample comprised of large taxpayers, while the popular, accounting for 88 percent, represented taxpayers from Domestic Revenue Department. Among 11 economic activities, four activities represented approximately 57 percent of the sample namely manufacturing (16 percent), financial services (15 percent), construction (14 percent) and professional services (13 percent). 81 percent received training on e-filing, this indicates strong awareness of the e-filing system. However, 19% of firms lacked e-filing training, indicating a need for targeted interventions. Regarding the scale of operations, the data indicate that 91 percent, were local enterprises, whereas multinational enterprises represented 9 percent of the sample. This distribution featured the predominance of local businesses within the surveyed population.

4.2. Descriptive Statistics for the Measurement Scales

4.2.1. Trust

Trust as presented in Table 2 indicated the overall mean score presented high validity (M4.06; SD = 0.80) suggesting a higher level of trust in the e-filing system. Further, low standard deviation provides assurance that taxpayers' trust is consistent and stable. The item with the highest score was 'e-filing system is for our company/business benefit' (M = 4.15; SD = 0.72) while the item with the lower score was "we are willing to integrate our system with the e-filing system" (M = 3.92; SD = 0.88). Overall, taxpayers have trust with the e-filing system and the trust is not volatile. However, willingness to integrate the company

systems with the digital tax filing system is slightly lower. Although, taxpayers trust the system, concerns about business information privacy may be barriers for integration.

Table 2: Descriptive Statistics for Trust Facilitation Items

	Trust Facilitation Items	Codes	Mean	Std Deviation
1	E-filing safeguard company privacy	TSTI	4.05	0.78
2	With an E-filing system, no business information leakage	TST2	4.11	0.75
3	We are willing to integrate our system with the e-filing system	TST3	3.92	0.88
4	E-filing system was for our company/business benefit	TST4	4.15	0.72
	Overall	TST	4.06	0.80

Source: Research data (2024)

4.2.1.1. Tax Information Quality

The results in Table 3 show that the tax information quality had the mean of 3.50 indicating positive taxpayers' perception on relevance of the tax information and standard deviation of 1.68, indicate high volatility of taxpayers' opinion regarding relevance of the tax information. Further analysis of the one-way ANOVA indicated significant difference among means of the groups (f10.50; P.001), the post hock test indicated variation arose among taxpayers of different departments (LTD and DRD). On the other hand, it was found that there were no significance differences between multination and taxpayers operating locally, taxpayers in different sectors of operation and business age.

Table 3: Descriptive Statistics for Tax Information Quality Items

S/N	System Quality Factors Items	Codes	Mean	Std Deviation
	Tax Information Quality Items			
1	Information provided by e-filing is up-to-date information	INQ1	3.6	1.57
2	Information provided by e-filing is easy to read and understand	INQ2	3.9	1.38
3	Information provided by e-filing is accurate	INQ3	3.33	1.89
4	Information provided by e-filing is relevant	INQ4	3.22	1.9
5	Information provided by e-filing meets our needs	INQ5	3.55	1.83
6	Information provided by e-filing is reliable	INQ6	3.77	1.33
7	Information provided by e-filing is sufficient	INQ7	3.12	1.83
	Mean score for INQ	INQ	3.5	1.68

Source: Research data (2024)

Tax Service Quality

The overall mean score is 3.11 and standard deviation is 1.44 (Table 4). The following assertion scored low mean and high standard deviation 'E-filing tax system provides standardised services' (M = 2.70; SD = 1.85) followed by 'E-filing tax system provides reliable services' (M = 2.86; SD = 1.28). One way ANOVA results indicated significance difference among means of the groups (f10.50; P.001), a further analysis of the post hock test indicated variation emanate from large and domestic revenue departments; taxpayers with and without e-filing training as well as taxpayers operating locally and multination. Hence, it is essential to standardize tax services as well as improve reliability of the services.

Table 4: Descriptive Statistics for Tax Services Quality Items

S/N	System Quality Factors Items	Codes	Mean	Std Deviation
	Tax Service Quality Items			
1	E-filing provides prompt response to questions	SEQ1	3.03	1.35
2	E-filing provide modernised taxation services	SEQ2	3.3	1.5
3	E-filing provides simplified services	SEQ3	3.18	1.5
4	The E-filing tax system provides standardised services	SEQ4	2.7	1.85
5	E-filing tax system provides on-time services	SEQ5	3.65	1.22
6	The E-filing tax system provides reliable service	SEQ6	2.86	1.28
7	The E-filing tax system provides customised services	SEQ7	3.07	1.39
	Mean score for SEQ	**SEQ**	**3.11**	**1.44**

Source: Research data (2024)

4.2.1.2. Tax System Quality

The mean score for tax system quality was 3.64 and standard deviation of 0.93 (Table 5), indicating strong appreciation of the taxpayers regarding the digital tax filing system and the opinion are consistent and stable. However, 'the E-filing website provides fast information access' (M = 3.26; SD = 1.27) and 'E-filing is a reliable system' (M = 3.11; SD = 1.12) scored slightly lower mean and volatile opinion compared to other indicators. This suggests that there are significant differences among users, possibly due to infrastructure challenges, user experience levels, or system downtime during peak tax periods. The variation as indicated by the ANOVA post hock test arise between taxpayers who attended and those who did not attend the training, taxpayers across large and domestic revenue department; and between locally and cross border operation.

Table 5: Descriptive Statistics for Tax System Quality Items

S/N	System Quality Factors Items	Codes	Mean	Std Deviation
	Tax System Quality Items			
1	E-filing is easy to use	SYQ1	3.95	0.89
2	E-filing is easy to navigate and accomplish tasks quickly	SYQ2	3.91	0.85
3	E-filing is a reliable system	SYQ3	3.11	1.12
4	The e-filing website provides fast information access	SYQ4	3.26	1.27
5	E-filing can be accessed immediately	SYQ5	3.67	0.82
6	E-filing provides helpful instruction for performing tasks	SYQ6	3.62	0.82
7	E-filing provides logical sequence of tasks	SYQ7	3.97	0.74
	Mean score for SYQ	**SYQ**	**3.64**	**0.93**

Source: Research data, (2024)

4.2.1.3. Tax System Usage

The results in Table 6 indicated the overall score was mean of 4.10 and standard deviation of 0.91, indicating positive perception and stable construct. Majority of the indicator's mean values scored above four and the standard deviation scored less than one. An exception occurred to *"E-filing tax system has enabled us to become compliant"* (M = 3.40; SD = 1.48), implying existence of variability in opinion regarding the ability of tax system to make taxpayers compliant. This may be influenced by the challenge of accessibility of the tax system during due dates. However, one way ANOVA post hock analysis indicates that variability arises between taxpayers with and without e-filing training and taxpayers from large taxpayers and domestic revenue department.

Table 6: Descriptive Statistics for Tax System Engagement

S/N	Tax System Engagement Facilitation Items	Codes	Mean	Std Deviation
1	Using e-filing has improved our performance in filing tax returns	SE1	4.18	0.97
2	Using e-filing has enabled easy and comfortable communication with tax officials	SE2	4.17	0.68
3	Using e-filing provides an opportunity for the completion of multiple tasks	SE3	4.27	0.77
4	E-filing tax system has enabled us to become a compliant taxpayer	SE4	3.40	1.48
5	Using e-filing has enhanced our productivity in filing tax returns	SE5	4.30	0.79

6	Using e-filing has improved effectiveness in filing tax returns	SE6	4.09	0.97
7	Using e-filing has facilitated the sharing of specific information with TRA	SE7	4.30	0.74
	Overall	SE	4.10	0.91

Source: Research data (2024)

4.2.1.4. Tax Compliance Burden

Descriptive statistics for the tax compliance burden scales are presented in Table 7. The scale comprised of 4 items reflecting a reduction in tax compliance burden in relations of time. The highest score of the experience appeared to be an item 'E-filing system simplifies the process of determining tax liability' (M = 4.15; SD = 0.72) and the lowest score appeared 'E-filing system lessens the time spent on meeting tax compliance obligation' (M = 3.94; SD = 0.76). This highlights the existence of time-consuming procedures or system overload during the due dates which concerns taxpayers' expectations with regard to reduction of time.

Table 7: Descriptive Statistics for Tax Compliance Burden

S/N	Tax Compliance Burden (TCB) Items	Codes	Mean	Std Deviation
1	E-filing tax system makes filing of tax returns convenient and less costly	TCBs1	4.09	0.68
2	E-filing system lessens the time spent on meeting tax compliance obligation	TCBs2	3.94	0.76
3	E-filing system simplifies tax reporting and payment	TCBs3	4.00	0.73
4	E-filing system simplifies the process of determining the tax liability	TCBs4	4.15	0.72
	Overall	TCB	4.05	0.72

Source: Research data (2024)

4.3. Normality Test

The normality was examined through ranges for skewness value of less than +/- 2, and kurtosis of the measurement of less than +/-3. As indicated by Hair *et al*., (2010), the skewness of all the constructs and the Kurtosis of the majority of the constructs are within the recommended range. Other scholars consider a higher range of skewness of up to +/- 7 to represent normality in data (Byrne, 2010). Kurtosis of two items is from "tax system engagement" construct (SE3 = 3.370) and 'tax compliance burden" construct (TCBs = 3.074). Hence, according to Byrne (2010), the sample was drawn from the normally distributed population.

4.4. Common Method Bias

The variance attributable to the measurement method was analysed, and the result indicated that the total variance attributable by one factor was 26.403 percent far below the threshold of 50 percent recommended by Rajapathirana and Hui (2018) indicating that bias is unlikely to significantly affect results. Similarly, as indicated in Table 8, variance extracted for each individual construct falls below the threshold. Hence, there is no symmetrical error resulting from the common method used to measure the constructs.

Table 8: Construct Variance Extracted

Construct	Number of indicators	% of Variance
Information Quality	5	29.619
System Quality	5	9.791
Service Quality	7	7.192
Trust	4	3.228
System Engagement	5	3.228
Tax Compliance Burden	3	2.537

Source: Research data (2024)

4.5. Exploratory Factor Analysis

The KMO and Bartlett's test results indicated 0.889 and a significance of 0.000. Hence, the underlying dimensions of the constructs and strong correlation between indicators existed (Table 9). Furthermore, the study unveils whether the related or unrelated variables do not fit for factor analysis through application of an extraction method of principal axis factoring and a rotation method Varmax with Kaiser Normalisation by suppressing loading below 0.5 for practical relevance (Hair *et al*., 1998). The following unique factors were ignored INQ2, INQ6, SYQ3, SYQ4, SE2, SE6, and TCBs2.

Table 9: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**0.889**
Bartlett's Test of Sphericity	Approx. Chi-Square	6769.548
	Df	406
	Sig.	0.000

Source: Research data (2024)

4.6. Reliability Test

The reliability was evaluated through factor loadings and internal consistency. The initial analysis indicated that the factor loadings of two constructs from service quality factor; namely SEQ1 (0.669) and SEQ6 (0.603) loaded below 0.70 as recommended by Hair (2019). Lower loading adversely affects the construct reliability, validity and predictive relevance; hence they were excluded for further analysis. The Cronbach alpha (CA) and composite reliability (CR) and Rho_A (Hair, 2019) for internal consistence as reported in Table 10 in Appendix 2 indicates the CA estimates ranged between 0.82 and 0.88. According to Nunnally (1975) and Hair et al. (2014), the alpha coefficients above 0.70 are considered good. The CR results are within the recommended range of 0.70 and 0.90 (Hair, 2019) . All constructs demonstrated strong internal consistency with Cronbach's alpha and composite reliability values exceeding the 0.70 benchmark.

4.7. Convergence Validity

The extent to which each construct converges to explain variance in the indicator was assessed using AVE. As recommended by (Hair, 2019), all the factors scored an AVE above 0.50 (Table 10 in Appendix 2) which indicates variance in the construct explained by more than 50% of indicators (Hair *et al*., 2021).

4.8. Discriminant Validity

The study evaluated discriminant validity using both HTMT and Fornel-Larker criteria. HTMT, a correlation based method is robust and sensitive compared to the traditional Fornel-Larker variance based method for assessing the distinction of the construct in the model, as recommended by Ab Hamid et al. (2017). The results indicate that the HTMT values of all indicators were below the 0.850 (Table 11) (Henseler *et al*., 2015).

Table 11: Results of HTMT Discriminant Validity

Constructs	INQ	SE	SEQ	SYQ	TCBs	TST
INQ						
SE	0.346					
SEQ	0.377	0.424				
SYQ	0.294	0.499	0.379			
TCBs	0.189	0.64	0.355	0.637		
TST	0.263	0.696	0.285	0.511	0.551	

Source: Research data (2024)

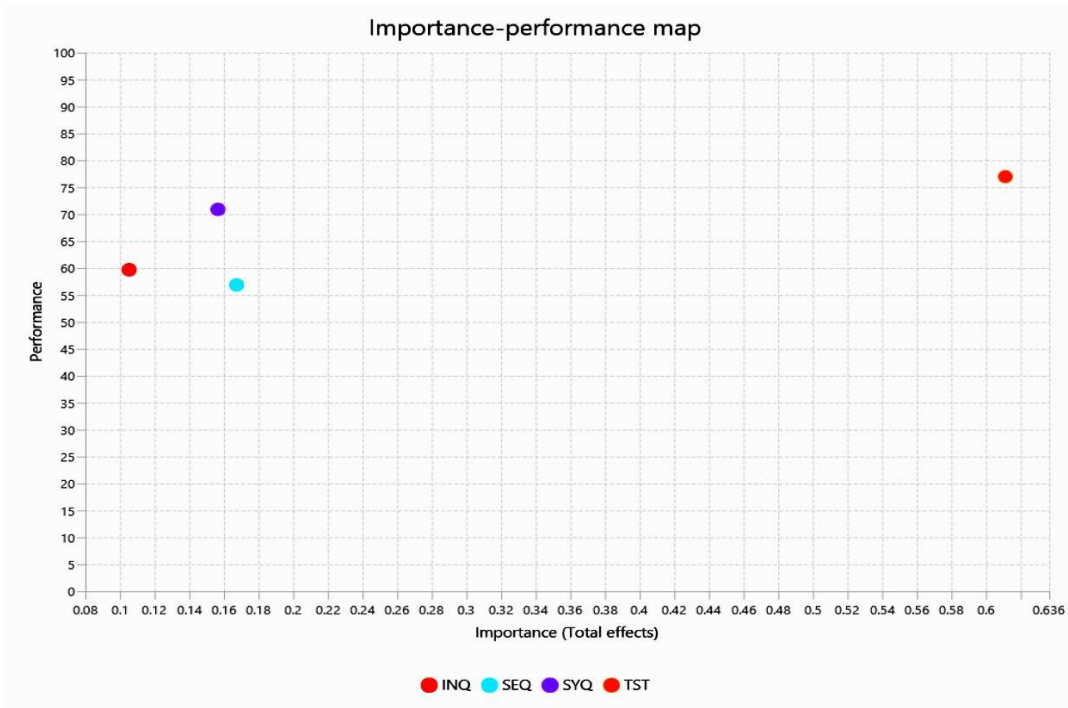
Notes: INQ – Tax Information Quality; SE – Tax System Engagement; SEQ – Tax Service Quality; SYQ – Tax System Quality; TCB – Tax Compliance Burden; TST – Trust

4.9. Importance Performance of the Constructs

4.9.1. Tax System Usage

The results of the IPM as depicted in figure 1 indicate that trust is the leading construct in terms of both importance (0.611) and performance (76.981) for determination and prediction of taxpayers' usage of e-filing systems. The result support the assertion by Ejdys (2020) that trust determines future use of technology. This result underscores the role of transparency and taxpayer's confidence in digital systems. Policy measures should focus on enhancing credibility through secure system design, proactive taxpayer engagement, and visible anti-corruption efforts within tax institutions. Meanwhile, tax system quality followed in performance (70.891) but its importance (0.156) fell below the score for tax service quality. The high-performance result supports the findings by (Jumanne & Mrindoko, 2022; Veeramootoo et al., 2018) that filing of return depends on the quality of the system. Tax service quality is the least construct in performance (56.877) while the second in terms of importance (0.167). Tax information quality performance (59.692) was third in ranking but least construct in terms of importance (0.105). Thus, trust is a core construct for taxpayers' engagement with the tax system, followed by the tax system quality, tax system information then tax service quality. This justifies the importance of tax officials to conduct in a manner that demonstrates high level if integrity, professionalism, trustworthy and accountability while increasing level of engagement with taxpayers, transparency and good customer services (TRA, 2023).

Figure 1: ***Importance Performance Map for e-filing Use***

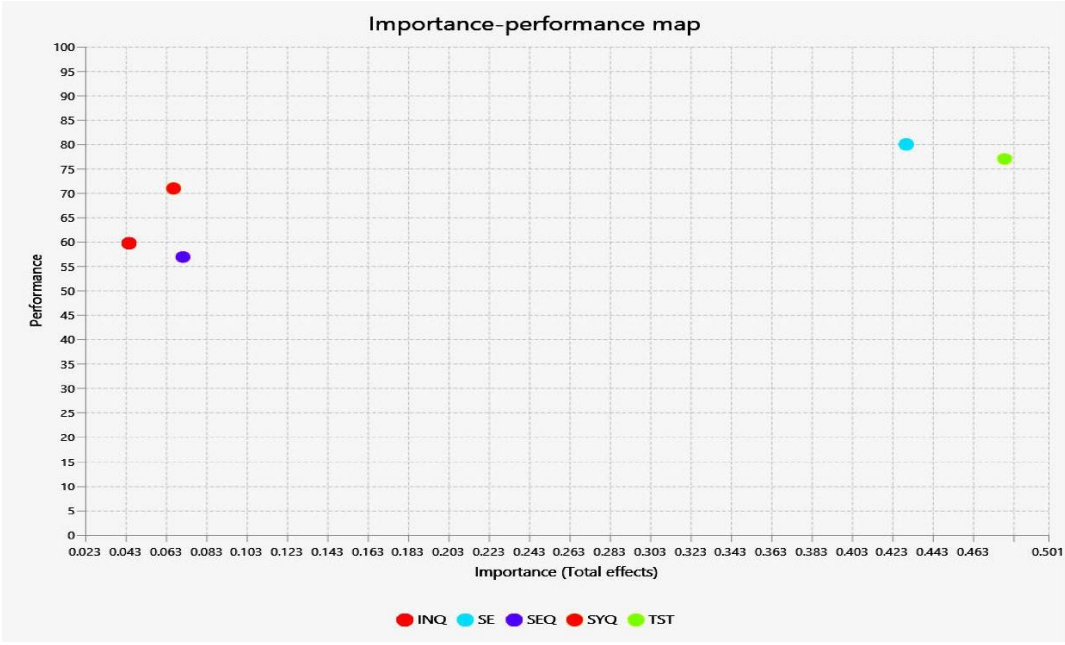


Source: Research data (2024)

4.9.2. Tax Compliance Burden

The results of the IPM as depicted in Figure 2 indicate that trust (0.479) is the leading construct in importance for determination of reduction of tax compliance burden, followed by the tax system engagement (0.43), tax service quality (0.072), tax system quality (0.067) and tax information quality (0.045). However, the results in terms of performance in reduction of tax compliance burden indicated that tax system usage ranked first with 79.979 scores, followed by trust (76.981), tax system quality (70.891), tax information quality (59.692) and lastly, tax service quality (56.877). Thus, it was indicated that trust is very important in influencing perception of taxpayers towards fairness and equity of the system. Taxpayers will experience the actual reduction of tax compliance burden by actual use of e-filing system. Furthermore, although the tax information quality is ranked last in importance, in terms of the actual performance in reduction of tax compliance burden, it cannot be under scored.

Figure 2: Importance Performance Map for Tax Compliance Burden



Source: Researcher data (2024)

5. Discussion of the Findings

5.1. Trust with Tax Agency

Taxpayers indicate a high level of trust that is both precise and stable toward e-filing system. The consistence of the trust construct is evidenced by the analysis of the importance performance map where trust emanated as a leading construct for prediction of e-filing usage, determining the future use of the e-filing system (Ejdys, 2020). Furthermore, leads in importance and second in performance for reduction of tax compliance burden. As indicated by Munisi et al. (2024), that taxpayers perceptionof system usefulness increase confidence in e-government (Putra et al., 2022).

Despite the consistence and stability of the trust construct, taxpayers' willingness to integrate their business systems with tax system was low. The results suggest persistent doubts about data security and privacy. These concerns mirror the findings by Sichone et al., (2017) and Kimea et al., (2019) on e-filing adoption resistance. To enhance trust, tax agencies need to implement stricter cybersecurity measures, ensure transparency in data handling, and effectively communicate these protections to taxpayers.

5.2. E-filing System Quality Factors (information, services and system)

The taxpayers indicate a general positive perception of information quality, but these opinions were volatile. The volatility stemmed from concerns about relevance, accuracy, updated on time as well as being comprehensive and meet diverse needs of taxpayers. Thus, reflect the results of the importance performance map where in both cases, information quality ranked second last in performance and least in importance. (Milamo & Magobe, 2024; Veeramootoo et al., 2018) similarly found that information quality insignificantly determines taxpayers' engagement with the tax system.

Likewise, tax service quality scored positive perception towards the quality of the services received in relation to the e-filing system. However, the opinions were not stable in the aspects of un-standardised services and reliability of the services. The variability arisen from difference in tax departments. Yet, in terms of importance, services quality ranked the least in terms of performance for ensuring both e-filing use and reduction of tax compliance burden. However, in terms of importance, service quality is ranked second and third for e-filing use and tax compliance burden respectively. This indicate that the tax services are inadequate but taxpayers consider as its critical factor to influence engagement and compliance. Thus, implying existence of performance gap and opportunity for tax agency to improve tax services. The findings supports the findings of (Veeramootoo et al., 2018), (Wagiman et al., 2023) and (Kaban et al., 2023). The result justifies that the importance of the service quality cannot be neglected for the purpose of improving the image of the tax agency.

Finally, tax system quality indicated stability and consistence of opinion. Thus, it provides efficiency in meeting tax obligation related to submission of tax returns (Jumanne & Mrindoko, 2022). This aligns with the results of the Importance Performance Map, where system quality ranked second in performance and third in importance for predicting e-filing use. These findings support the results of (Masunga et al., 2020; Milamo & Magobe, 2024; Veeramootoo et al., 2018). Despite stability of the opinion, concerns on reliability and quick access of information emanated, concerns indicating need for tax authority to work on accessibility and enhance stability of the system by large taxpayers in 2014/15 perception survey (TRA, 2017).

5.3. E-filing System Use

The construct for e-filing usage indicates higher positive and stable belief of the taxpayers toward the e-filing system. However, taxpayers indicated variability in opinion regarding the ability of the e-filing use to make taxpayers compliant. Suggesting that some taxpayers

face challenges beyond system usability such as complex tax regulations, un-tailored support or system inefficiencies during deadline. (Jumanne & Mrindoko, 2022) suggest that taxpayer education programmes targeting specific diversity of the business could bridge this compliance gap. The results of Importance Performance Map justify the strength of the e-filing system use. The results indicated the construct is the leading predictor of reduction of tax compliance burden and second in importance after trust. The findings coincide with studies conducted in tax system context (Jumanne & Mrindoko, 2022; Maro, 2023; Millenia et al., 2022). However, the findings of studies in context other than tax, where system use insignificantly determined net benefits of the company (Aditya et al., 2020; Al-Mamary, 2019; Angelina et al., 2019; Garomssa et al., 2021). Thus, tax agency, need to ensure taxpayers are equipped with competences required for using e-filing system.

6. Conclusion and Recommendations

This study underscores the central role of trust, system quality, and e-filing usage in reducing taxpayers' compliance burden. Trust was identified as the most influential factor driving e-filing adoption and shaping taxpayers' perceptions. While system performance and service quality also contributed significantly, areas such as inconsistent tax information, limited system accessibility during peak periods, and lack of standardized service delivery require attention. Strengthening trust and system reliability remains essential for promoting sustained use of digital tax platforms and enhancing voluntary compliance.

To address these gaps, tax authorities particularly the Tanzania Revenue Authority should prioritize accurate, timely, and industry-specific tax information. Standardized services across departments, customer service training for frontline staff, and the adoption of AI-driven tools such as chatbots will enhance accessibility and responsiveness. Infrastructure upgrades to manage filing-period traffic will also improve user experience. A structured trust-building framework is recommended, based on five pillars: transparency, system reliability, service responsiveness, data protection, and taxpayer empowerment.

Future research should examine the long-term impact of fully implemented systems like IDRAS on taxpayer compliance and satisfaction. Expanding the model to include individual taxpayers and public institutions, and adopting longitudinal or experimental designs, would provide richer insights into behavioural changes and digital tax administration outcomes over time. These findings will be critical in informing policy and refining digital transformation strategies in tax administration.

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APPENDIX 1

Table 1: Summary of Descriptive Characteristics of the Sample

Attribute	**Frequency**	Percent
Business size		
Medium taxpayers	362	88.3
Large taxpayers	48	11.7
Total	**410**	**100**
Business age		
0 – 10 years	229	55.9
11 – 25 years	160	39
Above 25 years	21	5.1
Total	**410**	**100**
Economic Activities		
Financial services and Insurance	62	15.1
Manufacturing	65	15.9
Agriculture	18	4.4
Transport	35	8.5
Hospitality	22	5.4
Telecommunication	6	1.5
Professional Services	54	13.2
Construction	59	14.4
Mining, Oil and gas	19	4.6
Wholesale	41	10.0
Other (security, health, education services etc)	29	7.1
Total	**410**	**100**
Scale of operation		
Local	374	91.2
Multinational	36	8.8
Total	**410**	**100**
E-filing training		
Yes	330	80.5
No	80	19.5
Total	**410**	**100**

Source: Research data (2024)

APPENDIX 2

Table 10: Assessment of Reliability and Convergent Validity

Construct indicators		CA	rho_c	rho_a	AVE
Tax Information Quality (INQ)		**0.862**	**0.889**	**0.899**	**0.641**
INQ1: Information provided by e-filing is up-to-date information	0.781				
INQ3: Information provided by e-filing is accurate	0.845				
INQ4: Information provided by e-filing is relevant	0.869				
INQ5: Information provided by e-filing meets our needs	0.716				
INQ7: Information provided by e-filing is sufficient	0.783				
Tax System Engagement (SE)		0.864	0.877	0.901	0.647
SE1: Using e-filing has improved our performance filing tax returns	0.775				
SE3: Using e-filing provides opportunity for completion of multiple tasks	0.797				
SE4: E-filing tax system has enabled us to become a compliant taxpayer	0.742				
SE5: Using e-filing has enhanced our productivity in filing tax returns	0.849				
SE7: Using e-filing has facilitated sharing of specific information with TRA	0.852				
Tax Service Quality (SEQ)		0.85	0.874	0.891	0.622
SEQ2: E-filing provide modernized taxation services	0.773				
SEQ3: E-filing provides simplified services	0.736				
SEQ4: E-filing tax system provides standardised services	0.8				
SEQ5: E-filing tax system provides on-time services	0.822				

Construct indicators		CA	rho_c	rho_a	AVE
SEQ7: E-filing tax system provides customised services	0.807				
Tax System Quality (SYQ)		0.888	0.893	0.918	0.69
SYQ1: E-filing is easy to use	0.811				
SYQ2: E-filing is easy to navigate and accomplish tasks quickly	0.859				
SYQ5: E-filing can be accessed immediately	0.82				
SYQ6: E-filing provides helpful instruction for performing tasks	0.833				
SYQ7: E-filing provides logical sequence of tasks	0.83				
Tax Compliance Burden (TCB)		0.845	0.847	0.906	0.763
TCBs1: E-filing tax system makes filing of tax returns convenient and less costly	0.889				
TCBs3: E-filing system simplifies tax reporting and payment	0.878				
TCBs4: E-filing system simplifies the process of determining tax liability	0.853				
Trust (TST)		0.828	0.864	0.885	0.66
TST2: With an E-filing system, no business information leakage	0.846				
TST3: We are willing to integrate our system with the e-filing system	0.736				
TST4: E-filing system was for our company/business benefit	0.902				
TSTI: E-filing safeguard company privacy	0.755				

Source: Research data (2024)

Notes: CA-Cronbach Alpha; rho_c - Composite reliability; rho_a - Composite reliability; AVE – Average Variance Extracted.

Importation Dynamics and Their Impact on Tax Revenue in Tanzania: A Time-Series Analysis, 1994–2023

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Abstract

This study investigates the dynamics of importation and their impact on tax revenue in Tanzania using annual time-series data spanning from 1994 to 2023. Despite the significant role of trade taxes in Tanzania's fiscal structure, existing literature offers limited insight into the temporal behavior of imports and their implications for revenue generation. Grounded in tax elasticity theory, this study employs both Vector Autoregression and Ordinary Least Squares models to assess short-term dynamics and long-run effects. Diagnostic tests confirm that all variables tax revenue, import values, exchange rate, and inflation are stationary at first difference and cointegrated, validating their joint long-run relationship. The VAR results reveal a cyclical pattern in import behavior, with significant lag effects at the 10% and 5% levels, indicating that historical import levels influence current trends. OLS results show that importation has a statistically significant and positive effect on tax revenue ($\beta = 0.3501$, $p < 0.001$), supporting the tax elasticity hypothesis. Additionally, both exchange rate depreciation and inflation exhibit strong positive impacts on tax revenue, reflecting their role in shaping import values and, consequently, the tax base. These findings underscore the need for policies that stabilize import flows and account for macroeconomic fluctuations to enhance revenue predictability. The study enriches regional literature with dynamic modeling and evidence to inform fiscal policy in Tanzania and similar economies.

Keywords: Importation, Tax revenue, exchange rates, inflation, Tanzania

1.0 Introduction

Tanzania's economic development has been a subject of much debate, with researchers and policymakers exploring various elements of its growth trajectory. One of the important areas of focus has been the dynamic of importations and how it affects government tax revenue (Bevan, 2010). Tanzania, like other developing countries, has encountered challenges in generating sufficient tax revenue to support its local institutions and service provisions (Hussein and Abdallah, 2022)the main specific objective was concerned about the effect of financial depth on tax revenue in Tanzania. This study adopted quantitative

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approach and time series as research design, this study was conducted in Tanzania. Because of the accessibility of the data for the time of 19962 020. The annual time series data for the Tanzanian financial development and tax revenue were obtained from secondary sources which include the World Development Indicators (WDI. Studies e.g. Le et al. (2012) shows that the country's tax effort indices, which measure the ratio of actual tax revenue to potential tax revenue, have consistently lagged behind those of Organization for Economic Co-operation and Development (OECD) countries. This disparity suggests that Tanzania has not fully utilized its revenue potential and underscores the need to understand the specific dynamics of importation and their impact on tax revenue. According to Kitessa and Jewaria (2018)tax has not increased with increasing development expenditures. In place, the share of tax revenue to gross domestic product (GDP importation is one of the important factors that contributes to tax revenue in any country, as it directly influences the overall fiscal health of the country.

The dynamics of importation can be characterized by a significant reliance on foreign goods, driven by various factors, including the limited capacity of local industries to meet domestic demand (World Bank, 2020). Recent statistics reveal that Tanzania's total import value has surged, reaching approximately USD 16.67 billion in 2022, from USD 11.61 in 2023 with a substantial portion attributed to consumer goods and raw materials, reflecting the growing demand in the domestic market. This dependence on imports has implications for the trade balance and fiscal policy, as high levels of imports can exacerbate trade deficits in case of no correspondence to exports, which can create pressure on foreign exchange reserves (International Monetary Fund, 2021).

In Tanzania, importation serves as a crucial source of tax revenue, significantly impacting the government's fiscal framework. Key tax components derived from imports include Value Added Tax (VAT) on imports, import duties, and excise duties, and other import charges which together contribute substantially to tax revenue. In the fiscal year 2022/23, VAT on imports accounted for 14.4% of total tax revenue, illustrating the importance of imported goods in the taxation landscape (URT, 2023). Furthermore, in the fiscal year 2023 import duties slightly increased from 7.31% in 2022 to 7.52%, while excise duties on imports decreased, from 6.1% in 2022 to 5.9%, other imports charges increased from 12.6% in 2022 to 13.3% highlighting the complexities within import-related taxation.(Mpfubhusa and Devotha, 2024; Semboja et al., 2022) These dynamics demonstrate that the reliance on imports not only influences revenue generation but also can reflects broader economic patterns, including the capacity of local industries, and engagement in regional economic blocs such as the East African Community (EAC) and the Southern African Development Community (SADC).

In the literature, various studies have explored Tanzania's tax revenue in various aspect for example in respect to tax administration (Francis Kipilimba, 2018; Semboja et al., 2024) whereby questionnaires have been used to access the required information. Researcher has been able to collect information from 85 respondents out of 100 targeted respondents from the area of the study. Findings of this study have been analyzed and reveal that, Good tax design, Effective tax policy and laws, Tax administrative structure, Tax collection methods, Proper use of computerized system of maintaining taxpayer Register, Outsourcing revenue collections to private tax collectors, Internal and external capacity building, Intensive coordination with other entities and Proper maintenance of taxpayer's records are the main factors that enhance effective tax administration in Tanzania. It is concluded that Corruption practices on taxation issues, lack of awareness of Local Tax payers, political pressure to relax tax collections, ineffective tax laws and policies, Insufficient budget or funds, High rate of Tax evasion and avoidance, Outsourced revenue retained by Revenue collectors, lack of tax compliance, are the challenges facing tax administration in Tanzania. Also concluded that eradication of the mentioned challenges above effects/results to, Adequate tax collections, Efficient tax system, High tax compliance by tax payers, Attainment of revenue targets, Increase in tax bases and declined cost of revenue collection, Minimum Tax evasion and avoidance, and High service delivery capability are the impacts that result from Tax administration. Researcher has recommended for the following to be done on the way forward:Emphasis has to be put on the tax laws and policies mechanism to be reviewed time to time in order to save the purpose due to the prevailing situation, international tax environments, and the changes on the technology on tax administration. Efforts should be put on improving the tax payer's convenience in the assessment and payment process whilst at the same time entrenching effective and modern human resource management practices in the tax authorities in respect to vetting, recruitment and selection of employees. Tax collection Authorities should ensure that all revenue receivables are paid promptly into designated bank accounts and failure to do so within the stipulated period of time should attract to the severe penalties to the officers concerned.",”container-title”:”Social Sciences”,”DOI”:”10.11648/j.ss.20180701.13”,”ISSN”:”2326-9863”,”issue”:”1”,”jo urnalAbbreviation”:”SS”,”language”:”en”,”page”:”13”,”source”:”DOI.org (Crossref, determinants of tax revenue (Ibrahim and Jairo, 2023; Kitessa and Jewaria, 2018)tax has not increased with increasing development expenditures. In place, the share of tax revenue to gross domestic product (GDP, determinants of imports (Vacu and Odhiambo, 2022), there remains a lack of focused analysis on how importation dynamics specifically impact tax revenue in the Tanzanian perspective. Thus, this study seeks to address this gap by first, analyzing the dynamic on importation on the import values of goods and services in Tanzania. Second, examine the impact of importation on total tax revenue in Tanzania.

The study is significant to various stakeholders including tax administrations and policymakers. For tax administrations, understanding how dynamics of importation influence tax revenue is vital for optimizing tax administration strategies and enhancing revenue forecasting models. The study provides guidance for tax administrations to identify potential areas for reform concerning administrative strategies on importation to align with economic realities. For policymakers, the findings provide information on formulation of policies that optimize revenue collection from importations.

2.0 Review of Literature

2.1 Theoretical Review

The tax elasticity theory provides theoretical foundation to understand the dynamic of importation and their effect on tax revenue in Tanzania, especially when taking into account-controlled factors like exchange rates and inflation rates. This theory posits that tax revenue is responsive to changes in its base, which in the context of importation, refers to the volume and/or value of goods entering the country (Epaphra, 2015). According to Semboja (2022) tax responsiveness or elasticity captures the degree to which tax revenue adjusts proportionally to changes in economic activities, such as increased or decreased importation volumes. The theory further assumes that ceteris paribus, a rise in imports, which is frequently made possible by trade liberalization or economic growth, will broaden the tax base and raise tax revenue proportionately, particularly from tariffs and customs charges (Maganya, 2020).

Furthermore, tax elasticity theory offers a framework to understand whether tax system is responsive enough to capture revenue from increased or decreased importation under varying economic conditions (Rwechungura, 2016). Controlling for variables such as exchange rates and inflation rates enables a more precise analysis, as these factors directly affecting importation and tax revenue (Queku et al., 2024)the macroeconomic environment-tax revenue nexus has been less studied in collective Africa. This study extends the current understanding by integrating variance partitioning approaches to comprehensively explain the dynamics. The macroeconomic environment is operationalized using exchange rate (EXR. For instance, exchange rate variations, can either inflate or deflate import values, impacting the base on which import-related taxes are calculated. Similarly, inflation affects the purchasing power and cost of imports, further influencing the taxable value of goods entering the country (Nguvava and Bandile, 2025). By employing the tax elasticity theory, the study seeks to analyze the dynamic of importation and their impact to tax revenue in Tanzania from 1994 to 2023.

2.2 Empirical Literature Review

In developing countries such as Tanzania, where import-related taxes constitute a significant share of government revenue, understanding the macroeconomic dynamics that shape import flows is critical for fiscal policy. Several empirical studies have examined how exchange rate movements, inflation, and trade liberalization affect tax revenue performance. For instance, Astuti (2023) highlights how exchange rate fluctuations and inflation influence import levels, which in turn impact customs and trade-based revenues. Similarly, Agbeyegbe et al. (2019) found that trade liberalization, through reduced tariffs and trade barriers, enhances tax revenue indirectly by increasing trade volume. However, most of these studies employ static models, failing to capture the dynamic and time-lagged effects that characterize importation behavior over time.

A notable gap in the literature lies in the underutilization of dynamic time-series methods such as Vector Autoregression (VAR), particularly within the East African Community (EAC) and Southern African Development Community (SADC) contexts. For example, while Gupta and Varshney (2021) and Dejene et al. (2019) provided valuable insights into the negative effects of import volatility on tax revenue in India and Canada, respectively, these findings may not fully reflect the trade structures or fiscal systems of sub-Saharan Africa. A more relevant regional study by Khatibu et al. (2022) found that fluctuations in Tanzanian import duties significantly reduce tax revenue stability, underscoring the fiscal risks posed by volatility in trade. Likewise, Levin (2019) emphasized the challenges of fiscal planning caused by unpredictable import tax collections in Tanzania. However, both studies rely on descriptive analysis or basic econometric techniques and do not explicitly model the time-dependent behavior of imports.

More recently, region-specific empirical evidence has emerged. For instance, a study published in the East African Journal of Business and Economics by Mchopa and Massawe (2023) assessed the effects of exchange rate volatility and inflation on Tanzania's trade balance using time-series data from 1990 to 2020. Their findings show that fluctuations in macroeconomic variables significantly affect trade flows, thereby influencing the volume and predictability of import-related tax revenue. Additionally, data from the African Economic Research Consortium (AERC) show that Tanzania's customs revenue constituted approximately 44% of total tax revenue during key EAC integration phases, highlighting the country's fiscal dependence on trade taxation and the vulnerability of revenue to import shocks (AERC, 2023).

Despite these contributions, few studies in the region have examined the dynamics of importation using advanced time-series tools such as VAR, which can uncover lagged

effects and feedback relationships. This is a critical oversight, given the cyclical nature of international trade and the sensitivity of tax revenue to import patterns. Accordingly, this study addresses an important methodological and contextual gap by applying a VAR-based time-series analysis to evaluate how the dynamics of importation affect tax revenue in Tanzania between 1994 and 2023. In doing so, it offers a more robust and policy-relevant understanding of tax-trade linkages in the Tanzanian context.

3.0 Methodology

3.1 Research approach, Data and Variables Measure

The variables used in this study tax revenue, import values, exchange rate, and inflation rate were carefully selected based on their empirical relevance to the dynamics of international trade and domestic fiscal performance in Tanzania. Tax revenue, modeled in logarithmic form, captures the government's fiscal capacity and follows Kilindo (1997), who assessed Tanzania's public finance trends. Import values, also log-transformed, represent the core variable of interest and align with Ahmad, (2014), who examined how trade liberalization shaped Tanzania's import flows and growth. The exchange rate was included due to its influence on the cost of imports and revenue from import duties, as shown in Chindengwike, (2024) study on exchange rate dynamics. Lastly, The inflation rate controls for changes in the general price level, which can influence both import demand and the nominal tax revenue collected (Todorova and Myftarallari, 2024)we review the effect of demand shifters such as consumer income and the level of advertising on the average price level in a simple partial market equilibrium model. Then, we discuss the effect of supply shifters such as the exogenous tax level, worker wage, rental rate, and technology. We use implicit differentiation and Jacobian determinants. While government spending triggers inflation, taxes have the opposite effect. This is consistent with Keynesian theory. Money supply increases national income and prices while reducing the equilibrium interest rate. Therefore, money supply has pro-inflationary effects. The effect of money demand is the opposite—it increases the equilibrium interest rate, thereby lowering national income and prices. Augmenting the model to the level of international trade, we find that exports raise national income, the interest rate, and the average price level, while the effect of imports is just the opposite. Government spending raises the exchange rate while continuous inflation lowers it.","container-title":"Economies","DOI":"10.3390/economies12050121","ISSN":"2227-7099","issue":"5","journalAbbreviation":"Economies","language":"en","license":"https://creativecommons.org/licenses/by/4.0/","page":"121","source":"DOI.org (Crossref. These variables were selected based on their theoretical relevance to the study's objectives.

3.2 Analytical framework

The study is grounded in tax elasticity theory, which posits that tax revenues are responsive to changes in the tax base. In the context of import taxation, the theory suggests that as import values increase, tax revenues from customs duties, value-added tax on imports, and other import-related taxes will also increase proportionally. The theoretical model can be expressed as:

Tax Revenue = f(Import Values, Exchange Rate, Inflation Rate)

3.3 Model Specification

3.3.1 Vector Autoregression (VAR) Model

To analyze the dynamics of importation, a Vector Autoregression (VAR) model was employed. The VAR model allows for the examination of interdependencies and potential lagged relationships within time series data. The general form of the VAR model is specified as:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + ... + A_p Y_{t-p} + BX_t + \varepsilon_t$$

Whereby Yt = vector of endogenous variables at time t, A_1, A_2, ..., Ap = coefficient matrices, Xt = vector of exogenous variables, B = coefficient matrix for exogenous variables, εt = vector of error terms p = lag length.For this study, the VAR model specifically examines the dynamics of importation:

$$\Delta IMP_t = \alpha_0 + \alpha_1 \Delta IMP_{t-1} + \alpha_2 \Delta IMP_{t-2} + \alpha_3 \Delta IMP_{t-3} + \varepsilon_t$$

Where by ΔIMPt = first difference of log import values at time t, α_0 = constant term, α_1, α_2, α_3 = coefficients for lagged import values, εt = error term

3.3.2 Ordinary Least Squares (OLS) Regression Model

For the second objective examining the impact of importation on tax revenue, an OLS regression model was specified as:

$$\ln(TR_t) = \beta_0 + \beta_1 \ln(IMP_t) + \beta_2 \ln(EXR_t) + \beta_3 INF_t + \varepsilon_t$$

Where by $\ln(TR_t)$ = natural logarithm of tax revenue at time t, $\ln(IMP_t)$ = natural logarithm of import values at time t, $\ln(EXR_t)$ = natural logarithm of exchange rate at time t, INF_t =

inflation rate at time t, β_0 = intercept, β_1, β_2, β_3 = coefficients for independent variables and ε_t = error term

3.4 Econometric Procedures and Diagnostic Tests

3.4.1 Unit Root Testing

Prior to model estimation, the stationarity properties of all variables were examined using the Augmented Dickey-Fuller (ADF) test. The ADF test examines the null hypothesis that a series contains a unit root (non-stationary) against the alternative hypothesis that the series is stationary. The ADF test equation is specified as:

$$\Delta Y\_t = \alpha + \beta t + \gamma Y\_\{t-1\} + \delta_1 \Delta Y\_\{t-1\} + \delta_2 \Delta Y\_\{t-2\} + ... + \delta\_p \Delta Y\_\{t-p\} + \varepsilon\_t$$

Whereby ΔYt = first difference of the variable, α = constant, β = coefficient on time trend, γ = coefficient testing for unit root, δ_1, δ_2, ..., δ_p = coefficients on lagged differences, εt = error term

The null hypothesis is H_0: $\gamma = 0$ (unit root exists) versus H_1: $\gamma < 0$ (series is stationary).

3.4.2 Cointegration Testing

For variables that are integrated of the same order, cointegration analysis was conducted using the Johansen cointegration test to determine the existence of long-run relationships between variables. The Johansen test is based on the Vector Error Correction Model (VECM):

$$\Delta Y_t = \Pi Y_{t-1} + \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + ... + \Gamma_{p-1} \Delta Y_{t-p+1} + \varepsilon_t$$

Where Π is the coefficient matrix containing cointegrating relationships.

3.4.3 Lag Length Selection

The optimal lag length for the VAR model was determined using information criteria including Akaike Information Criterion (AIC), Hannan-Quinn Information Criterion (HQIC) and Schwarz Bayesian Criterion (SBIC) and the lag length that minimizes these criteria was selected for the VAR model.

3.4.4 Serial Correlation Testing

The Breusch-Godfrey Lagrange Multiplier (LM) test was employed to test for serial correlation in the residuals. The null hypothesis states that there is no serial correlation: H_0: $\rho_1 = \rho_2 = ... = \rho\_p = 0$.

3.4.5 Multicollinearity Testing

To ensure the reliability of the regression results, multicollinearity among explanatory variables was tested using the Variance Inflation Factor (VIF). A VIF value exceeding 10 indicates the presence of severe multicollinearity.

3.4.6 Normality Testing

The Jarque-Bera test was conducted to examine the normality of residuals. The null hypothesis assumes that residuals are normally distributed.

4.0 Results and Discussions

4.1 Descriptive Statistics

Table 1 presents the descriptive statistics which shows that, on average tax revenue is 6.618 with standard deviation of 0.555, indicating moderate variability around the mean, its values range from 5.718 to 7.441. The skewness of -0.108 suggests a slight leftward skew, indicating that data are slightly concentrated toward higher values. The kurtosis value of 1.625 indicates a distribution that is flatter than normal. These statistics suggest that tax revenue collection has been relatively stable over the period, with a consistent upward trend. For importation, the mean was 3.772, and the standard deviation 0.319, showing that the level of importation is consistent with minimal variation ranging from 3.289 to 4.222 which reflect a narrow range of importation value. The kurtosis value of 1.527 indicates a relatively flat distribution, meaning there are few extreme values in importation. The skewness of -0.273 suggests a slight left skew, indicating that most importation values are clustered on the higher end. This shows that importation levels remain steady, with some instances of slightly lower values.

From Table 1, exchange rate on average is 3.122 and a standard deviation of 0.189, with a range from 2.763 to 3.361. The slight skewness of -0.219 indicates that exchange rates have been fairly stable, the kurtosis of 1.953 indicate that data distribution is close to normal, implying limited extreme fluctuations in the exchange rate over the observed period. Finally, inflation rate has a mean of 1.972 with a standard deviation of 0.249, reflecting

moderate variation across observations. Its skewness of 0.016 and kurtosis of 1.579, lower than 3, suggest that inflation rate has been quite stable over the observed period.

Table 1: Descriptive statistics

Variables	Obs	Mean	Std. dev.	Min	Max	Kurtosis	Skewness
Tax Revenue	30	6.618	0.555	5.718	7.441	1.625	-0.108
Importation	30	3.772	0.319	3.289	4.222	1.527	-0.273
Exchange rate	30	3.122	0.189	2.763	3.361	1.953	-0219
Inflation rate	30	1.972	0.249	1.538	2.337	1.579	0.016

Source: Authors' computations (2024)

4.2 Diagnostic Tests

4.2.1 Stationarity Test

Before estimating the model, diagnostic tests were performed to ensure robustness of the results (Cryer and Chan, 2009).Thus, data stationarity was tested using the Augmented Dickey-Fuller (ADF) test. The ADF test examines the null hypothesis that the series follows a random walk without drift (i.e., the series has a unit root). In Table 2, all the test statistics are significantly below the critical values at the 1%, 5%, and 10% levels leading to rejection of the null hypothesis, this confirm that the variables became stationary at first difference, suggesting that the assumptions for further time series analysis were not violated.

Table 2: The Dickey-Fuller Test Results

Variable	p-value for Z(t)	Test statistics	Critical value		
			1%	5%	10%
D_Tax revenue	0.000	-5.204	-3.730	-2.992	-2.626
D_Importation	0.002	-4.499	-3.730	-2.992	-2.626
D_Exchange rate	0.000	-4.977	-3.730	-2.992	-2.626
D_Inflation rate	0.000	-5.137	-3.730	-2.992	-2.626

Source: Authors' computations (2024)

The results indicate that all variables are stationary at first difference, as evidenced by test statistics that are significantly more negative than the critical values at all significance levels. This confirms that all variables are integrated of order one [I(1)], satisfying the prerequisite for further time series analysis.

4.2.2 Cointegration Test Results

Given that all variables are integrated as shown in table 3 of order one, the Johansen cointegration test was conducted to examine the existence of long-run relationships between the variables. The test results indicate the presence of one cointegrating relationship among the variables, suggesting that despite short-term fluctuations, the variables move together in the long run.

Table 3: Johansen Cointegration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.
None *	0.7234	56.234	47.856	0.0045
At most 1	0.4567	28.123	29.797	0.0721
At most 2	0.2345	12.456	15.495	0.1345
At most 3	0.1234	3.789	3.841	0.0516

*Note: * denotes rejection of the hypothesis at the 0.05 level Source: Authors' computations (2024)*

4.2.3 Serial Correlation Test

The serial correlation was tested using the Breusch-Godfrey LM test with the null hypothesis that there is no serial correlation in the residuals. The test results in Table 4 show a chi-squared statistic of 0.234 and a corresponding p-value of 0.628 and lag 2 of chi-square 1.456 and p-value 0.483 which indicate that null hypothesis was not rejected, meaning that there is no serial correlation and following this the OLS was employed in the modelling as shown in Table 4 indicate no evidence of serial correlation.

Table 4: Breusch-Godfrey LM Test for Serial Correlation

Lags(p)	chi2	df	Prob > chi2
1	0.234	1	0.628
2	1.456	2	0.483

H_0: No serial correlation ***Source**: Authors' computations (2024)*

4.2.4 Multicollinearity Test Results

The Variance Inflation Factor (VIF) test was conducted to assess multicollinearity among explanatory variables and All VIF values are below 5, indicating no severe multicollinearity among the explanatory variables.

Table 5: Multicollinearity Test Results

Variable	VIF	1/VIF
Importation	2.34	0.427
Exchange Rate	1.89	0.529
Inflation Rate	1.67	0.599
Mean VIF	1.97	

Source: Authors' computations (2024)

4.2.5 Normality Test Results

By using Jarque-Bera the normality test show that the data are normally distributed hence support the use of OLS model

Table 6: Jarque-Bera Normality Test

Test Statistic	p-value	Decision
2.456	0.293	Fail to reject H_0

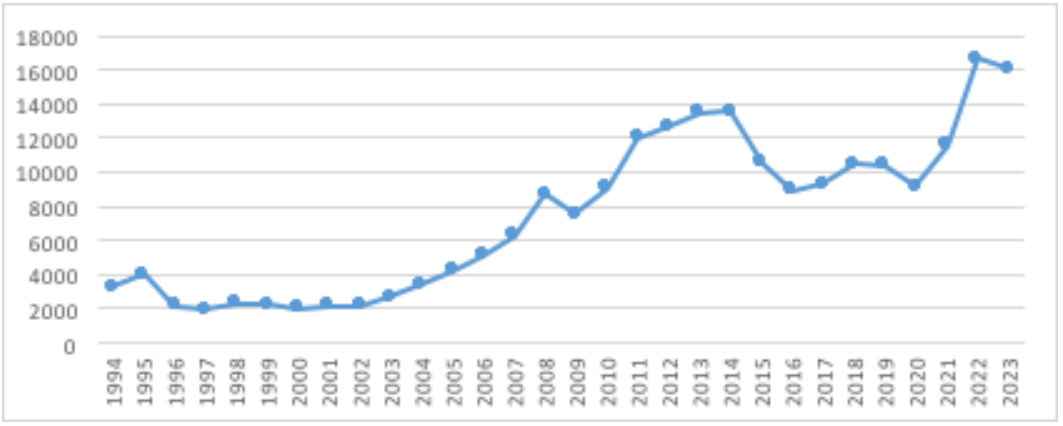
H_0: Residuals are normally distributed Source: Authors' computations (2024)

4.3 Dynamics of Importation Analysis

4.3.1 Trend analysis

The dynamics of importation from 1994 to 2023, analyzed through a line graph and VAR model, reveal distinct phases. From 1994 to 2004, import values were relatively stable, reflecting economic constraints. A sharp rise between 2005 and 2013 suggests increased external demand and economic expansion, followed by a decline from 2014 to 2017 due to global and currency shocks. Import values rebounded from 2018, peaking in 2022–2023, signaling renewed economic activity. These trends underscore the importance of understanding import fluctuations for fiscal planning, consistent with Mwakalobo and Moshi (2007), who linked Tanzania's import behavior to broader structural and external conditions.

Figure 1: Importation Value in Tanzania (1994-2023) in TZS Billion



Source: Authors' computations (2024)

This resurgence in import levels highlights the growing reliance on foreign goods to support economic recovery and growth. This dynamic emphasizes the need for Tanzania to enhance its production capabilities and diversify trade relationships to ensure balanced and resilient trade environment.

4.3.2 Lag Length Selection for VAR Model

The optimal lag length for the VAR model was determined using various information criteria. Table 7 presents the results of lag length selection.

Table 7: Lag-Order Selection Criteria

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	30.894				0.005*	-2.392*	-2.378*	-2.343*
1	31.547	0.305	1	0.253	0.005	-2.364	-2.336	-2.266
2	31.712	0.330	1	0.565	0.006	-2.297	-2.257	-2.151
3	33.662	3.899*	1	0.048	0.005	-2.373	-2.319	-2.178
4	33.689	0.053	1	0.816	0.006	-2.295	-2.228	-2.051

*Note: * indicates lag order selected by the criterion Source: Authors' computations (2024)*

Based on the Likelihood Ratio (LR) test, lag 3 was selected as optimal for the VAR model analysis.

4.3.3 Model estimation for Vector Autoregression Model

Table 8 presents the Vector Autoregression (VAR) results, revealing significant cyclical dynamics in Tanzania's importation behavior from 1994 to 2023. The first lag (L1) shows

a positive coefficient (0.325, $p = 0.080$), indicating a moderately persistent effect of past importation levels, though statistically significant at the 10% level. The third lag (L3) is positive and statistically significant at the 5% level (0.301, $p = 0.035$), suggesting a recurring pattern in import behavior approximately every three years highlighting cyclical importation trends. Conversely, the second lag (L2) has a negative coefficient (-0.220, $p = 0.144$), though not statistically significant, hinting at a possible corrective mechanism or market adjustment effect.

These dynamics imply that previous import levels play a meaningful role in shaping current import volumes, which aligns with tax elasticity theory where fluctuations in imports directly influence customs-related tax revenue. Therefore, understanding these lagged effects is vital for crafting adaptive trade and fiscal policies that stabilize revenue flows amidst external shocks.

Table 8: Findings from Vector Autoregression Model

D_importation	Coefficient	Std. err.	z	P>|z|	[95% conf. interval]	
L1.	0.325	0.185	1.750	0.080	-0.038	0.689
L2.	-0.220	0.150	-1.460	0.144	-0.515	0.075
L3.	0.301	0.143	2.100	0.035	0.020	0.583
_cons	0.022	0.013	1.650	0.098	-0.004	0.049

Source: Authors' computations (2024)

4.5.2 Impact of Control variables on revenue

The Ordinary Least Squares (OLS) regression model was used to estimate the impact of importation and key macroeconomic variables on tax revenue in Tanzania from 1994 to 2023. The model results in Table 9 show a strong overall fit ($R^2 = 0.936$, $F = 123.10$, $p < 0.001$), indicating that importation, exchange rate, and inflation collectively explain over 93% of the variation in tax revenue.

Table 9: Impact of Control Variables on Revenue

Source	**SS**	**df**	**MS**	Number of obs. = 29		
Model	0.404	3	0.134	F (3, 25) = 123.10		
Residual	0.027	25	0.001	Prob > F = 0.000		
Total	0.431	28	0.015	R-squared = 0.936		
				Adj R-squared = 0.929		
				Root MSE = .0330		
Variable	***Coeffi-cient***	***St. error***	***t***	***P>|t|***	***[95%conf. interval]***	
Log_(Importa-tion)	0.3501	0.0871	4.02	0.000***	0.170	0.529
Log_Inflation	0.9413	0.322	2.92	0.007***	0.277	1.605
Log_Exchange rate	1.0887	0.255	4.26	0.000***	0.561	1.615
_cons	0.0007	0.007	0.11	0.915	-0.013	0.015

Source: Authors' computations (2024)

Importation

The regression results in table 9 demonstrate a statistically significant positive relationship between importation and tax revenue (coefficient = 0.3501, $p < 0.001$). This finding strongly supports the tax elasticity theory, which posits that tax revenue is responsive to changes in the tax base. A 1% increase in import values is associated with approximately 0.35% increase in tax revenue, indicating that imports are a crucial source of government revenue in Tanzania.

This positive relationship is consistent with findings from previous studies in similar contexts. Basirat et al. (2014) found a positive relationship between imports and tax revenue in Iran, while Berghe (2023) reported similar findings for sub-Saharan African countries. The magnitude of the coefficient suggests that import-related taxes, including customs duties, value-added tax on imports, and excise duties, constitute a significant portion of Tanzania's total tax revenue.

Exchange Rate

The positive and statistically significant coefficient for exchange rate (1.0887, $p < 0.001$) indicates that exchange rate depreciation leads to higher tax revenue. This relationship can be explained by the fact that when the Tanzanian Shilling depreciates against the US Dollar, the domestic currency value of imports increases, thereby raising the tax base for ad valorem taxes. However, this relationship may have long-term implications for import demand and overall economic stability (Todorova and Myftarallari, 2024).

Inflation Rate

The positive relationship between inflation rate and tax revenue (0.9413, $p < 0.01$) reflects the impact of general price level changes on tax collection. Higher inflation rates increase the nominal values of imports, leading to higher tax revenues. This relationship is particularly important for tax policy formulation, as it highlights the need to consider macroeconomic stability in revenue forecasting (Basirat et al., 2014).

4.5.4 Policy Implications

The strong positive relationship between importation and tax revenue suggests that policies aimed at facilitating legitimate trade can significantly enhance government revenue. However, the cyclical nature of imports revealed by the VAR analysis indicates the need for revenue forecasting models that account for these patterns to ensure fiscal stability.

The significant role of exchange rate and inflation in tax revenue determination underscores the importance of macroeconomic stability for fiscal performance. Policymakers should consider the trade-offs between exchange rate depreciation's positive impact on tax revenue and its potential negative effects on import demand and overall economic stability.

5.0. Conclusions and Recommendations

The study found that importation significantly impacts tax revenue in a positive way, while controlling for exchange rate and inflation rate. It was further found that the dynamics of importation exhibited an upward trend, the vector autoregressive model highlighted a cyclical pattern in the dynamics of importation with significant positive effects from past import values which indicate that historical importation trends play an important role in shaping tax revenue outcomes.

Based on the findings, this study recommends that policymakers focus on stabilizing importation flows to ensure consistent tax revenue generation. Given the significant role of the exchange rate, efforts to stabilize the currency would help balance the immediate benefits of higher revenue with potential long-term impacts on trade volumes. Additionally, inflation control is essential to prevent erosion of purchasing power and its adverse effects on economic activity, even though it may temporarily boost nominal tax collections. Furthermore, policies aimed at diversifying the tax base, particularly through enhanced consumption tax collection such as VAT, would help mitigate the volatility in revenue from import duties. Strengthening enforcement to reduce the size of informal sector and bring more economic activities under the tax net is also recommended to improve revenue stability. Finally, continued monitoring of the cyclical trends in importation is important

for informed policy decisions that can adapt to economic shifts and maintain a sustainable revenue base for the Tanzanian economy.

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The Role of Artificial Intelligence on Detecting Customs Fraud in Tanzania.

Lessons from Leading Practices

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Abstract

This study aimed to examine the role of AI in detecting customs fraud. Specifically, it sought to identify opportunities for AI application, analyses adoption challenges and leading practices for detecting fraud in customs administration. Methodologically, the study deployed a systematic literature review of studies on AI applications in Customs by reviewing papers from 2018 to 2024. The findings reveal that the advent of big data has given rise to novel prospects in the use of AI for detecting Customs fraud. AI strengthens customs' capacity to identify anomalous declarations and illicit transactions. Moreover, AI adaptability challenges include skills gaps, financial resources, software malfunction, disruptive innovation, and deep-fake technology. Conversely, strategies to address software malfunction include adoption of intelligent software applications. The paper concludes by recommending adopting best practices, including acknowledging the potential applications of disruptive technologies, such as AI, to align with the pace of the private sector. More specifically, Customs in Tanzania should adopt AI in the valuation and classification of goods to address customs valuation and misclassification of goods fraud. Additionally, AI can intercept content and traffic data, perform forensic analysis, and detect, trace, and interrupt crimeware to fight customs-related fraud. Moreover, adopting Internet of Things (IoT) devices like drones, sensors, GPS, and biometrics to address the ever-changing risks and dangers is of utmost importance for the future success of customs.

Keywords: Artificial intelligence, Machine Learning, Customs, Customs Fraud, Detection.

1. Introduction

Advancements in technology have made the application of artificial intelligence (AI) essential for enforcement agencies such as Customs Administration. AI, a component of big data technologies (Mikuriya & Cantens, 2020), is a multifaceted field involving computer systems and applications capable of performing tasks typically associated with

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human intellect (Hulko, 2018). The AI can learn, reason, plan, perceive, or process natural language (Julius & Christabel, 2020). Literature shows that deployng AI enhances fraud detection by tracing fraudsters, analysing techniques, enabling advanced analytics and risk management, and improving audit accuracy. These technologies can be utilized alone or in combination to enhance the intelligence of customs applications (WCO/WTO, 2022). AI in Customs operations performs tasks accurately and efficiently. Accuracy and efficiency are critical to customs due to their importance in facilitating legitimate trade, revenue collection, enforcing compliance, and protecting society. Hence, adopting AI by customs improves its capacity to discharge its core functions, ascertain unscrupulous traders, and combat customs-related fraud (Sevinov & Khamroev, 2023).

Fraud is prevalent across sectors. Identifying and preventing fraud is a significant academic inquiry relevant to numerous societal stakeholders (Bao, 2022). Customs authorities often encounter fraud while discharging their dual responsibilities of trade facilitation and compliance enforcement (Zhou, 2019). Combating fraud in Customs is challenging due to the enormous volume of cargo and passengers crossing borders. As a study by Singh (2023) revealed, customs face the formidable task of managing an increasing magnitude of transactions due to ongoing connectivity expansion and globalization.

TheWorld Customs Organization (WCO) reported that in 2018 alone, customs administrations cleared USD 19.7 trillion worth of imports, processed 1.4 billion passengers, and collected 30% of global tax revenue. Similarly, the World Trade Organization (WTO) estimated that world merchandise trade volume for exports and imports reached USD 38 trillion in 2019 (Singh, 2023). Given the astronomical volume of cross-border flows, customs must balance facilitating trade and enforcing compliance (Veenstra & Heijmann, 2023). While customs struggle to achieve their objective, the realm of unlawful cross-border activity continues to be more complex for customs authorities to handle (Marinova, 2023).

Correspondingly, Matsudaira (2022) highlights that the rate of technological advancement in the private sector consistently surpasses that of the public sector, driven by financial incentives. In order to align with the private sector, customs authorities must acknowledge the potential applications of disruptive technologies such as AI. Adapting and utilizing these technologies will tackle the changing risks and dangers, which is essential for their future success. Tanzania adopted the automated system as part of the solution to address these defies, as the manual application of a significant volume of transactions is infeasible. Automated system applications in Tanzania include adopting Tanzania's electronic Single Window system (TeSWs) in 2021. TeSW is a web-based system that facilitates the integration of all stakeholders involved in the clearance of goods at the border or port.

This system supplements the Tanzania Customs Integrated System (TANCIS), founded in 2014 (World Bank, 2016). TANCIS facilitates the electronic submission and processing of customs declarations and the use of online platforms to exchange information. Moreover, the Tanzania Revenue Authority (TRA) introduced the Electronic Cargo Tracking System (ECTS) in 2012, which was applied to monitor transit cargo, and a container cargo scanner in 2010. The cargo scanner uses non-intrusive inspection (NII) technology to inspect goods without opening the container. NII technology facilitates the detection of concealed, restricted, and prohibited goods without unduly delay.

Notwithstanding the efforts made by the TRA and customs administration to enhance compliance with procedures, customs fraud is still reportedly persisting (PwC Report, 2023). The most prevalent customs fraud includes manipulating invoices to undervalue trade items to evade ad valorem charges and taxes (Kim *et al.,* 2020). Customs fraud poses a severe threat not only to the safety of people but also to the economic development, political stability, and social cohesion of countries across the globe (Chebotareva *et al.,* 2021). Many customs administrations worldwide have adopted AI to improve operations (Marinova, 2023). The literature shows that customs administrations in Hong Kong, China, the Netherlands, Japan, and Brazil reported to the WCO's forum in 2019 how they use data and AI for fraud detection. Similarly, France, the United Kingdom, New Zealand, and South Korea also shared their experiences applying data analytics and geospatial data in fraud detection and risk analysis (Mikuriya & Cantens, 2020; Chebotareva *et al.,* 2021). Moreover, the European Union (EU) developed an AI pilot project called "iBorderCtrl." The "iBorderCtrl" is a machine with AI capability introduced at border checkpoints for documentary control and customs purposes. Conversely, various customs administrations, including Korea, have reported positive outcomes of AI applications. The Korean experience showed that AI has helped customs detect fraud and fight revenue loss in cross-border areas of parcel traffic. Moreover, network analysis and mapping tools allowed Korea Customs to identify suspicious importers who used multiple addresses to organize split shipments.

The literature shows that numerous scholars have focused on AI applicability in businesses, governments, and customs. For instance, Guenduez and Mettler (2023) have examined the narratives of AI policies in 33 countries. Similarly, Julius and Christabel (2020) analysed the effectiveness and efficiency of AI in boosting customs performance, focusing on the Regional Electronic Cargo Tracking System (RECTS) in Uganda's Customs administration. Despite the importance of AI in facilitating trade, enhancing revenue collection, and enforcing compliance in customs, limited studies have been conducted on its use in fraud detection within the Tanzanian context.

Moreover, recent studies on customs fraud and its link with big data have been conducted in the developed world. These studies include a paper by Vanhoeyveld *et al.* (2020), who assess the value of behavioral and high-cardinality data in detecting customs fraud in Belgium. Triepels *et al.* (2018) examined the role of data-driven fraud detection in international shipping in the Netherlands, and Dangsawang and Nuchitprasitchai (2024) deployed machine language (ML), which is a branch of AI for detecting customs fraud in Thailand.

Therefore, little is known about AI's implementation challenges and the best policy options for customs adaptability in the Tanzanian context. Therefore, this paper fills the gap by shedding light on the opportunities, challenges, and best options from leading practices deploying AI in fraud detection in Customs. Consequently, the findings of the study contribute by ascertaining existing opportunities for applying AI to detect customs fraud. It also provides suggested solutions adopted from the leading practices in addressing challenges faced by Customs in adopting and applying AI in detecting fraud in critical functional customs areas, including cargo clearance, revenue collection, warehousing, valuation, tariff classification, border, and risk management. Henceforth, this paper is organized into five main sections: introduction, literature review, methodology, analysis and findings, discussions, conclusion, and recommendations.

2. Literature Review

Chebotareva *et al.* (2021) define AI as a program that applies specified algorithms to process large volumes of data rapidly. Through mathematical methods such as extrapolation, interpolation, calculus of variation, it can model, evaluate individual processes and automatically prepare or make decisions. Similarly, Matsudaira (2022) describes AI as an artificial creation of human-like intelligence that can learn, reason, plan, perceive, or process natural language. Using AI in customs control holds significant potential for improving efficiency and reducing the risk of smuggling.

Correspondingly, ML is a specialized field of AI that uses learning algorithms to extract insights from data, enabling the acquisition of new abilities, identification of patterns, and decision-making with minimal human intervention. ML can be seen as a data analytics technique that automates the process of predictive analysis. It is also considered an output of data mining, the computational procedure of identifying patterns within extensive datasets. Data mining is defined by Desiderio (2019) as the process of systematically examining data using AI frameworks, such as ML learning or agent-based network modeling. The deliberate alteration of goods declaration includes undervaluation of goods, misclassification in HS

codes, manipulation of countries of origin and smuggling of goods with a motive to avoid customs duties and taxes

Likewise, Kunickaite *et al.* (2023) defined Customs fraud as any fraudulent attempt to reduce the customs duty imposed on goods imported to a particular country from abroad. Equally, Singh (2023) describes customs fraud as the deliberate alteration of goods declarations to evade tax and duty obligations. The deliberate alternation of goods declaration includes undervaluing goods, misclassifying items under incorrect HS codes, and misrepresenting countries of origin. These actions are often carried out to evade customs duties and taxes through smuggling or deception.

2.1 Theoretical framework

Technology acceptance model (TAM)

TAM was founded by Davis in 1986. This theory posits that individuals' intention to use a technology is influenced by two primary factors. The perceived usefulness (PU) and perceived ease of use (PEU). The PU is the extent to which an individual believes that utilizing a specific technology will improve their job performance. PEU is defined as the extent to which an individual anticipates that the technology will be effortless to operate. Moreover, TAM assumes that users make rational decisions by considering the anticipated advantages and simplicity of technology use.

The above is supported by Marangunić and Granić (2015), who emphasized that individuals or entities are more likely to adopt a technology when they perceive it as enhancing their efficiency and aligning with their existing goals and objectives. This study seeks to utilize this theory to shed light on the dynamics of technology acceptance in the specific context of AI applications in detecting fraud in Customs. The ultimate goal is to provide valuable insights that can inform policy decisions.

Theory of Mind (ToM)

The ToM was introduced by Premack and Woodruff in 1978. The main assumption of ToM is that humans possess the cognitive ability to infer and interpret the mental states of others. This capability is fundamental to effective social interaction and the anticipation of behavior. In this study, the ToM informs the exploration of AI systems that aim to replicate aspects of human cognitive reasoning. AI systems that simulate ToM principles are better equipped to interpret user behavior, detect deceptions, and make context aware decision. ToM also helps to detect false or incomplete beliefs, allowing corrective interventions

(Oguntola *et al.,* 2023) Application of ToM proposition is witnessed in the use of robotics, visual recognition, and intelligent AI systems that are applied to detect fraud in customs.

2.2 Empirical literature

Kavoy (2020) examined the role of ML as an outlet of AI in supporting customs management intelligence. The findings of the study revealed that the proliferation of big data offers organizations the potential to enhance their comprehension of clients, formulate strategies that can produce supplementary revenue, and foster innovation in business models. To become intelligent, customs may implementimplement strategies that focus on attaining widespread use of AI throughout the entire organization. Similarly, a study by Julius and Christabel (2020) suggested that customs authorities must undertake audits of AI systems before and after their adoption to ensure the responsibility and accountability of AI systems.

A study by Park *et al.* (2022) emphasized that it is vital for customs authorities to share information regarding customs fraud. Information sharing can only be achieved by developing a collaborative customs fraud detection system. The system will enable information sharing across regional boundaries as it will use domain adaptation techniques and propose a new data prototype method to extract transferable knowledge from import declarations. Knowledge-sharing will facilitate data initiatives and strengthen policy against illegal trade activities.

The literature revealed that data science, as a component of AI, plays a crucial role in addressing deficiencies in revenue administration, identifying abnormalities and errors, forecasting fraudulent activities, offering proactive support to importers or passengers, ensuring a high level of trust for compliance purposes, and providing valuable insights for data-driven decision making (Felix *et al.,* 2022). Mai et al. (2021) reported that the change in data characteristics and distribution over time results in concept drift, which can either be gradual, incremental, recurrent, or sudden. To curb the concept drift, the researcher proposed a model called Adaptive Drift Aware and Performance Tuning (ADAPT), as it has two signals for data exploration and exploitation to assist in balancing the known fraud, secure the revenue, and ability to acquire knowledge about new fraudulent behavior.

As a strategy to enhance control at the border stations, US Customs uses Biometric Entry-Exit, the Chinese use Gait Technology, and the EU, since 2018, introduced iBorderCtrl on border checkpoints, which do both documentary and facial recognitions. AI holds a vital role in ports of travel due to the pressure of the high probability of fraudulent behavior and illegal crossing of international borders. US customs and Chinese authorities have adopted

biometric technology, which has the potential for integration of AI to result in advanced detection and imaging (Khan & Efthymia, 2021).

Moreover, AI improves biometric identity systems by analyzing gait or identifying absurd behavior. Under the Global State Development program "Made in china-2025," China has developed a new generation of AI. By 2017, China had five checkpoints using AI technology, which has sped the release of risk-free goods. Huawei and Nuctech are working to develop an intelligent customs infrastructure. They also use robots as customs officials in Guangdong province and have intelligent automobile customs posts at Huanggang. Robots are currently used in the Netherlands at the checkpoints of Rotterdam port, where robots provide almost the full range of cargo operations. At the same time, the role of customs inspectors is performed by 2 to 3 people, Chebotareva *et al.* (2021).

Omosa (2022) observed that East African countries use scanner technology to image goods in containers or tanks when implementing AI-based technology. Using X-rays in Customs offices has affected revenue collection from identification and proper classification of goods under correct duty payable, ensuring border security by detecting contra-hands and prohibited goods, and reducing clearance time. New Zealand customs use intelligence-driven customs operations by establishing a joint border management system comprising experts in data models, data science, business analysis, and subject matter experts. Mannisto *et al.* (2021) reported that the Dutch customs adopted advanced NII technologies and used x-ray image interpretation, dual-views x-ray, and near future computed tomography (CT) devices, vapor trace detections, and they have established customs laboratories closer to border and availability of standard laboratory technology that gives light to satellite labs which will speed up identification of illicit goods and materials found in the parcel traffic.

Kavoy (2020) revealed that Her Majesty's Revenue and Customs (HMRC) has gone further to deploy the Connect system that detects and prevents fraud. The connect data warehousing and analysis project relies on over 30 databases as a data source. This system facilitated the processing of documents, promptly identified irregularities, and explored novel avenues for prevention and deterrents. Kim *et al. (*2020) applied Dual-task Attentive Tree-aware Embedding (DATE) model, to categorize and prioritize the illicit trade flows that, when detected, generate the most significant amount of customs revenue overall. The dataset's results indicate that 89% of the additional tax income and about 90% of the frauds uncovered were gathered by inspecting the top 10% of questionable transactions found by the DATE model.

In their paper, Vanhoeyveld, Martens, and Peeters (2020) emphasize two critical aspects: behavioral and high-cardinality data. These scholars underscore the significance of detailed

characteristics, such as particular entities such as consignee, consignor, declarant, and the products associated with declarations, in accurately predicting outcomes. More so, they apply the EasyEnsemble method. This innovative technique combines a support vector machine-based learner with a confidence-rated boosting algorithm to tackle the significant imbalance in customs data. This approach significantly improves predictive performance, leading to better customs fraud detection.

Vanhoeyveld *et al.* (2019) noted that Belgium Customs evaluated an ensemble approach in detecting customs fraud. Similarly, De Roux *et al.* (2020) reported that AI, by using unsupervised spectral clustering, is effective at identifying fraud with few labels by Columbia. Moreover, Canrakerta *et al.* (2020) revealed that Indonesian customs suggested an assembly of neural networks, support vector machines, and tree-based techniques. Experience from the Netherlands showed that AI is constructed using neural networks with increasing and decreasing activity and a Bayesian network (Triepels *et al.,* 2018). A study by Mannisto et al. (2021) revealed that Customs employs mapping and network analysis technologies to identify suspicious importers who appear to be arranging split shipment fraud using numerous addresses. In addition, they utilize data analytics to identify fraud in packages. According to this scholar, specific countries like the Australia Border Force have adopted 3D algorithms by conducting sound-based inspection experiments to detect liquids. A vendor collection methodology has been implemented to enhance revenue collection within the e-commerce sector.

According to Singh et al. (2023), the WCO has implemented a deep learning-based technique called DATE to facilitate the advancement of ML in its partner countries. This approach considers the information of importers and their trade commodities, aiming to achieve state-of-the-art performance in detecting fraudulent transactions. Moreover, countries like India and China have implemented decision trees and neural network algorithms in their customs services. The graph neural networks for Customs Fraud (GraphFC) model was created due to its self-supervised nature and ability to optimize both the detection of fraudulent transactions and the collection of associated income. This model is designed to identify concealed fraudsters by converting tabular data into a graph format. Its primary objective is to enhance the detection of harmful customs transactions and optimize the detection of further fraudulent schemes.

Dangsawang and Nuchitprasitchai (2024) examined an ML approach for detecting customs fraud through unstructured data in social media in Thailand. The study applied Natural Language Processing (NLP) techniques to process the social media posts, machine learning (Logistic Regression (LR)) deep learning (Gated Recurrent Unit (GRU), and Long Short-

Term Memory (LSTM). The findings demonstrate that the LSTM strategy outperformed other methods in accuracy. Moreover, the LSTM was efficient in detecting traffickers and enforcing customs charges. The paper advocates using blockchain technology to develop a decentralized network for trading smuggling data. They also suggest customs professionals evaluate the approach every six months, considering actual restrictions to maintain its relevance and applicability. The recommendations show the commitment to flexibility and responsiveness in fighting customs fraud and promoting economic stability.

Matsudaira (2022) examined the link between Customs and digitization and noted that the rise in security threats and organized crime encompasses various criminal activities, including illicit activities, the financing of terrorists and organized criminals through tax evasion and avoidance, cross-border fiscal fraud, drug smuggling, the trafficking of prohibited items, money laundering, and the production of counterfeit goods. He, therefore, suggested that applying AI and ML techniques, such as implementing digital identification (ID) systems, can enhance the process of profiling and targeting, intercepting content and traffic data, conducting forensic analysis, and detecting, tracing, and interrupting crimeware. Additionally, he opined that utilization of NII technology, Internet of Things (IoT) devices such as drones, sensors, global position systems (GPS), and biometrics could significantly boost the coordination of border administration.

3. Methodology

This paper examined studies on the role of AI in detecting Customs fraud by reviewing widely recognized academic databases, including Google Scholar, Web of Science, and EBSCOhost, following a similar approach to that of Xiao and Watson (2019). In addition, specialized platforms and journals, including the World Customs Journal, Springer, Elsevier, SAGE Science Direct, Emerald, and ResearchGate were also reviewed to ensure comprehensive coverage of relevant literature.

To guarantee relevance and quality, the sources were chosen based on specific criteria. Peer-reviewed publications were prioritized due to their high level of scholarly rigour. Besides, the citation count was considered as a critical quality indicator, with papers that were highly cited being preferred due to their acknowledged contribution to the field. The research was limited to sources published between 2017 and 2024 to guarantee that it accurately reflects the most recent advancements in AI applications within the Customs process.

The Systematic Literature Review (SLR) was used in this study. The following keywords were used to search for published material: “The role of artificial intelligence in the detection of customs fraud,” “The role of artificial intelligence in customs,” “artificial intelligence in

customs," and "artificial intelligence in the detection of fraud." The preliminary relevancy of each manuscript was determined based on its title. The complete reference, including the author, year, title, and abstract, was retrieved for further review if the material addressed AI's role in detecting customs fraud.

4. Findings and Discussion

The study's outcome and discussion are divided into three areas: opportunities for AI utilization in customs, challenges facing its adaptability, suggested solutions, and lessons learned from leading practices.

4.1 Opportunities of AI utilization in Customs

The study revealed that customs administrations produce a substantial volume of unstructured data; nevertheless, the proportion that undergoes analysis remains uncertain. Unstructured data poses significant challenges to fraud detection. This is due to its complexity in processing, lack of format, as it does not follow a predefined model, and difficulty in integrating with structured data. To overcome these barriers, organizations must adopt advanced analytics and AI-driven tools capable of transforming unstructured inputs into actionable insights, enhancing the speed and accuracy of fraud detection systems. This view is similar to Bao *et al.* (2022), who suggested that the advent of big data and AI has given rise to novel prospects for using sophisticated ML models for fraud detection. Recent advancements in AI, particularly in ML, offer a novel approach to addressing fraud through data-driven methods (Xu, Wang, Liao, & Wang, 2023). Therefore, analyzing data and its deployment on AI has the potential to address customs fraud and enhance the fast clearance of goods.

This suggestion is underpinned by TAM theory, which posits the relevance and usefulness of technology such as AI in detecting customs fraud-associated imports and export declarations. Moreover, as revealed by Oguntola et al., 2023 use of ToM has facilitated the unearthing of false or incomplete beliefs and knowledge, which can be corrected through interventions by using AI. Positive outcomes have been reported by Mannisto, Morini, and Hintsa (2021), who revealed that AI deployment has significantly reduced clearance time in China, indicating favorable conditions for the movement of goods across the customs border. Correspondingly, Korea's experience showed that data visualization and analytics, which is part of AI, have helped customs detect fraud and fight revenue loss in cross-border areas of parcel traffic. Moreover, network analysis and mapping tools allowed Korea Customs to identify suspicious importers who used multiple addresses to organize split shipment fields.

Similarly, other customs administrations are deploying biometric technology in customs control. One of the critical advantages of biometric technologies in customs control is their speed and accuracy. Compared with usual identification methods, biometric technologies can quickly and accurately confirm the identity of individuals, reducing waiting time and increasing efficiency. The study's findings suggested the importance of building a database that feeds outcomes over the system so that customs can identify customs offenders according to their trends (Mannisto, 2021). Another positive development was reported by Desiderio (2019), who revealed that AI strengthens the customs to identify anomalous declarations and illicit or dubious transactions involving commodities, individuals, and monetary transactions.

4.2 Challenges facing AI adaptability

Despite innumerable benefits of AI applications in customs, Olomu (2023) revealed various challenges associated with AI technology in Customs operations. These challenges include AI skills gaps, financial resources, and software malfunction. The skills gap hinders AI adoptability by limiting access to the expertise needed to develop, deploy, and manage AI systems in Customs. Moreover, insufficient AI literacy led to misinterpretation of the outputs or failure to monitor the system properly, leading to flawed decisions. A lack of in-house expertise means businesses often rely on off-the-shelf solutions, which may not fully address the unique needs of Customs. This stifles innovation and limits the competitive edge AI could provide to customs.

In the context of financial resources, it restricts customs from investing in essential technology, software, and infrastructure upgrades. Insufficient finances may make it difficult for Customs to hire skilled AI professionals who are expensive due to demand and low supply. Moreover, it will be difficult to invest in training existing staff to work with AI systems or continuous monitoring, updating and maintenance of AI systems and infrastructure. Additionally, software malfunctions hinder AI adoptability by reducing trust in technology, disrupting operations, and increasing maintenance cost. Frequent errors or system failures can lead to incorrect decisions, data loss or security risks making organizations hesitant to rely on AI systems.

Strategies to address software malfunction include adopting intelligent software applications. It is also suggested that there is a need for building data management capabilities: Expertise in data cataloging and data warehousing is mandatory to manage and extract value from customs and trade data effectively. Building analytical competencies through enhanced skill sets such as data analyst, data scientist, business analyst, quantitative analyst, statistician, econometrician, and data-visualization specialist are called data experts. The literature

revealed that stakeholder cooperation and improved network connectivity are essential for the smooth deployment of AI.

Similarly, a study by Getman and Yilan (2023) revealed AI's challenges associated with emerging innovation incorporating deep-fake technology. Deep-fake technology modifies and fabricates data by fusing deep-learning algorithms with forgery. Related challenges are violation of intellectual property rights (IPR) and obstructing authorities from determining the origin of items. Fraudsters may also break into sophisticated customs equipment and alter real-time data, making it impossible to detect illicit activity or do risk assessments. In airport customs surveillance zones, deep fakes can deceive facial recognition systems. An international criminal or smuggler may use it to cross the border under a false identity. Face recognition, intelligent examination, and 350° intelligent monitoring systems used by e-Customs to process graph and video data may be vulnerable to attack. Impersonating a Customs officer with fabricated sounds or videos can deceive or blackmail declarants. Likewise, a multitude of apprehensions may emerge concerning the integrity. An instance of this can be observed when Customs agents employ deep phony technologies to manipulate audio and video data that originates from the organization's internal network.

4.3 Solution to challenges facing AI

To address challenges related to AI applications, including those emanating from deep-fake technology, customs may provide specialized training to its officers. This training aims to enhance the officers' ability to identify deep-fake works and effectively safeguard IPRs at the border. The potential collaboration between Customs authorities and scientific research institutes has the potential to facilitate the development of novel identification technology that is well-suited for Customs inspection purposes to enhance the detection rate of deep-fake works. It is widely acknowledged that numerous scientists are committed to advancing technology aimed at detecting deep-fakes, and they have indeed made notable progress in this area. Moreover, customs may adopt deep-fake identification technology, such as reverse cracking, which can identify face-transformation videos. Nonetheless, the effectiveness of cross-border supervision can be enhanced by customs authorities by utilizing a risk management system that integrates the technical inspection of e-customs with traditional physical inspection. Therefore, Customs may improve its internal network system of its system, thereby enhance security measures and bolstering the management power of the supervisory network. This is done to prevent data manipulation from actions taken by both the Customs and enterprise entities.

The literature revealed that the private sector consistently exhibits a greater technological advancement rate than the public sector, driven by its pursuit of increased profitability.

Henceforth, some Customs fraudsters employ new technologies to avoid paying duties-related taxes and circumvent regulatory requirements. Therefore, customs authorities must acknowledge the potential applications of disruptive technologies that customs fraudsters use (Matsudaira, 2022). Adapting and utilizing AI technologies to address the ever-changing risks and dangers is of utmost importance for the future success of customs. Therefore, various scholars proposed use of AI and ML techniques, such as digital ID systems, to improve profiling and targeting, intercepting content and traffic data, forensic analysis, and detecting, tracing, and interrupting crimeware. Moreover, adopting NII technology, internet of things (IoT) devices like drones, sensors, GPS, and biometrics may improve border administration cooperation and address customs-related fraud, including illicit activities, tax evasion and avoidance, cross-border fiscal fraud, drug smuggling, trafficking prohibited items, money laundering, and counterfeit goods production.

4.4 Lessons learned from leading practices

The Canada Border Services Agency (CBSA) has implemented an enterprise data warehouse to effectively handle large volumes of data, which it regards as a facilitator (Okazaki, 2017). This approach is highly relevant to developing countries such as Tanzania, where border management faces challenges such as limited resources, manual data handling, and weak integrations across agencies. One key transferrable lesson for least developed countries (LDCs) like Tanzania is the importance of improving data integration and visibility among border-related government agencies. In Tanzania's context, siloes systems currently hinder operational efficiency, collaborations, and oversight at border points.

The Customs and Excise Department of the Tanzania Revenue Authority can gain real-time, centralized access to critical data by adopting an enterprise data warehouse. This would facilitate quicker, more informed, and evidence-based decision-making essential for addressing issues such as smuggling, mis-declarations, and revenue leakage. Moreover, similar to CBSA, Tanzania's Customs administration could leverage data warehousing as a strategic foundation for future AI integration. This includes advanced tools for fraud detection, risk proofing, and border intelligence, allowing TRA to modernize its operations even within a resource-constrained environment. Slowey (2017) revealed that CBSA has transitioned from analyzing isolated areas to integrating various datasets to adopt a comprehensive approach that includes a cultural shift to promote a data-driven organization.

The study revealed that HMRC uses Connect to detect and address fraudulent actions. This system, which depends on more than thirty databases as its primary data source, has resulted in accelerated document processing, immediate detection of anomalies, and innovative opportunities for prevention and deterrence. Moreover, scholars, including

Kavoya (2020), suggest that customs may implement invest in capacity building, including acquiring the required technologies and talent, to become intelligence-driven. This is similar to the findings of Fountaine et al. (2019), who opined that organizations may focus on the following three transformations: First, organizations have to adopt cross-functional collaboration.

Business teams ought to work hand in hand with the analytics team to achieve broad AI adoption within an organization. Collaboration between diverse teams enables organizations to identify where new changes are likely required and plan. Secondly, decisions have to be based on data. Wider adoption will require employees at all levels to deliberately trust machine-generated insights as a backbone for decision-making. Human intuition and suspicions may be used to generate hypotheses that, once

As revealed by the literature and various scholars such as Matsudaira (2022) opined that customs may continue building the capacity of its staff and invest in adopting high tech, including IoT devices like drones, sensors, GPS, and biometrics, to improve border administration cooperation. Moreover, embracing the use of AI techniques encompasses several applications, such as the implementation of digital identification systems. These systems aim to enhance profiling and targeting capabilities, intercept content and traffic data, conduct forensic analysis, and detect, trace, and disrupt crimeware. To address duty and tax evasion-related fraud, customs may use AI to process customs declarations to classify and evaluate imported goods precisely.

5. Conclusion and Recommendations

This study examines the role of AI in Customs fraud detection. The findings of the study revealed opportunities and challenges posed by technological advancement. The study provides a lesson to Tanzania and other developing countries on how to use AI to detect and combat customs fraud. The study concludes that the advent of big data has given rise to novel prospects in using AI to detect customs fraud. Moreover, the study shows that embracing AI strengthens customs' capacity to identify anomalous declarations and illicit transactions. It also enhances customs capacity to discharge its core functions, detect unscrupulous traders, and combat customs-related fraud. AI can intercept content and traffic data, perform forensic analysis, and detect, trace, and interrupt crimeware to fight customs-related fraud. Moreover, adopting IoT devices like drones, sensors, GPS, and biometrics to address the ever-changing risks and dangers is of utmost importance for the future success of customs. Additionally, the study confirms the application of TAM and ToM theories through adopting technology such as AI as a relevant and valuable tool that assists Customs in detecting valuation fraud.

Besides, the study revealed that AI adaptability challenges include skills gaps, financial resources, software malfunction, disruptive innovation, and deep-fake technology. Conversely, strategies to address software malfunction include adopting intelligent software applications. Therefore, the Customs may consider building capacity for its staff and AI facilities. Since revenue collected by customs in Tanzania is significant, the focus may be on utilizing AI to classify and value goods to harness the rise in revenue fraud associated with risks related to the evasion and avoidance of duties and tax obligations. To WCO, as a global organization representing customs globally, the study recommends that it continue to make particular efforts to help customs worldwide resolve challenges resulting from disruptive ICT, such as deep fake technology concerns, and through collaboration with WTO, WIPO, and research institutions. Moreover, WCO may implement also facilitate the provision of technical assistance, human resource development, and best practices to handle disruptive ICT challenges globally.

This study has several limitations that are to be acknowledged. First, the study is predominantly focused on current literature and recent publications on the utilization of AI in Customs fraud detection. Although this offers a fundamental comprehension, it may not entirely encompass the latest technological advancements or disclosed industrial methodologies. Secondly, significance bias may exist in the literature selection process. The analysis predominantly depends on published academic and institutional sources, which may not encompass the entire ranges of AI application utilized in reality. Moreover, linguistics and publication biases may have omitted pertinent research published in non-English publications or less accessible databases.

The paper suggests that future research may focus on overcoming the above limitation by incorporating real- time data or using experimental design to evaluate the role of AI-based detection tools at TRA.

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This provides a summary of the paper. It should be well-written such that it provides a snapshot of the paper by highlighting objective, methodology, key findings, conclusion and recommendations.

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This section ought to provide a sufficient background on the problem or subject addressed by a manuscript, objective, significance of the study, research design (hypotheses or research questions, data, methodology). Finally, the introduction should provide an organization of the manuscript.

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The author ought to provide a critical relevant theoretical and empirical literature review clearly indicating knowledge gaps. Due recognition of works of previous researchers should be provided. Without disregard to the foundational theories, literature review should include recent works. Where relevant, the author should provide a conceptual framework.

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Booth, W. C., Colomb, G. G., and Williams, J. M. (2008). The craft of research (3rd ed.). University of Chicago Press. Chicago: University of Chicago.

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Al-Biman, M. (2022). Trade complementarities between Europe and Tanzania. In Trade and Investment in East Africa. Springer, Singapore. (pp. 85-107).

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Ibrahim. A. J. and Isaya, J. I. (2023). Determinants of tax Revenue Performance in the East African Countries, in African Journal of Economic Review, 11(2).

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