

DEVELOPMENTS IN THE USE OF TECHNOLOGIES IN AFRICAN TAX ADMINISTRATIONS

DÉVELOPPEMENTS DE L'UTILISATION DES TECHNOLOGIES DANS LES ADMINISTRATIONS FISCALES EN AFRIQUE

DESENVOLVIMENTOS NA UTILIZAÇÃO DE TECNOLOGIAS NAS ADMINISTRAÇÕES FISCAIS AFRICANAS

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JEL classification: E62, H20, H71, H83, O10

ABSTRACT

A substantial number of sub-Saharan African tax administrations have seen efficiency gains by adopting online systems for tax filing and payment. However, the adoption of technology for the automation of tax administration has been markedly slow in comparison to the pace of adoption in developed countries. For African countries' drive toward domestic resource mobilisation to be successful, automation of core processes is fundamental and the adoption of standards in international cooperation, improving data quality and promoting fiscal decentralisation. This article demonstrates that while much progress has been made in automation, Tax Administration Diagnostic Assessment Tool assessments still illustrate several gaps experienced by tax administrations in compliance risk management, statistical analysis, bulk data analysis, and the quality of data. As reflected in stagnant tax gross domestic product ratios, without mitigating these risks and not seizing opportunities offered by instruments such as the exchange of information standards, advances made in automation run the risk of being nullified eventually. Therefore, African tax administrations need a digital roadmap and a set of metrics to measure their progress in automation.

Keywords: automation, tax administration, digital ledger technologies (DLT)

RÉSUMÉ

Un grand nombre d'administrations fiscales en Afrique subsaharienne ont renforcé leur efficacité en adoptant des systèmes en ligne de déclaration et paiement des impôts. Cependant, l'adoption de la technologie pour l'automatisation de l'administration fiscale est manifestement lente par rapport au rythme d'adoption dans les pays développés. Afin que les efforts des pays africains de pouvoir mobiliser les ressources nationales soient réussis, l'automatisation des processus de base est fondamentale ainsi que l'adoption des normes applicables en matière de coopération internationale,

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l'amélioration de la qualité des données et la promotion de la décentralisation fiscale. Ce papier démontre que bien que de nombreux progrès aient été accomplis ou réalisés en matière d'automatisation, l'outil des évaluations diagnostiques de l'administration fiscale (TADAT) décèle encore des lacunes rencontrées par l'administration fiscale par rapport à la gestion des risques de conformité, l'analyse statistique, l'analyse des données en masse, et la qualité des données. Les progrès réalisés en matière d'automatisation risquent d'être éventuellement annulés comme en témoignent la stagnation des ratios du produit intérieur brut fiscal sans mitiger ces risques et sans saisir les opportunités offertes par les instruments tels que l'échange des normes d'information. Par conséquent, les administrations fiscales africaines ont besoin d'une feuille de route (cahier de charge) numérique et d'un certain nombre de paramètres pour mesurer leur progrès en matière d'automatisation.

Mot-clés : *automatisation, administration fiscale, cahier numérique technologique*

RESUMO

Um grande número de administrações tributárias da África subsaariana tem registado ganhos de eficiência através da adopção de sistemas em linha para o registo e pagamento de impostos. No entanto, a adopção de tecnologia para a automatização da administração tributária tem sido marcadamente lenta em comparação com o ritmo de adopção nos países desenvolvidos. Para que o impulso dos países africanos no sentido da mobilização de recursos internos seja bem sucedido, a automatização dos processos centrais é fundamental bem como a adopção de normas na cooperação internacional, a melhoria da qualidade dos dados e a promoção da descentralização fiscal. O presente artigo demonstra que embora tenham sido feitos muitos progressos em matéria de automatização, as avaliações da Ferramenta de Avaliação Diagnóstica da Administração Tributária (TADAT) continuam a ilustrar várias lacunas sentidas pelas administrações tributárias na gestão do risco de conformidade, análise estatística, análise de dados em massa, e qualidade dos dados. Como se reflecte em índices estagnados de produto interno bruto fiscal, sem mitigar estes riscos e sem aproveitar as oportunidades oferecidas por instrumentos como o intercâmbio de normas de informação, os avanços feitos na automatização correm o risco de ser eventualmente anulados. Por conseguinte, as administrações tributárias africanas necessitam de um roteiro digital e de um conjunto de indicadores para medir o seu progresso na automatização.

Palavras-chave: *automatização, administração de impostos, tecnologias de livro- razão digital (TLD)*

I INTRODUCTION

‘Sophisticated information technology (IT) support has become an essential part of the fabric of modern tax administrations. IT plays a pivotal role in all aspects of tax administration – taxpayer interactions and service, registration, processing, accounting, work automation, workflow regulation, case management, and risk analysis and treatment. As administrations mature, the need for significant changes to the level of IT support emerge’ (Cotton & Dark, *Use of Technology in Tax Administrations 2: Core Information Technology Systems in Tax Administrations*, 2017).

Tax administration reforms are currently shaped by prioritising the functions that need automation, which platforms and software to buy and, ultimately, how these could be integrated into existing systems. These are important considerations because the success of embracing and implementing digital platforms within tax administrations is critical to the delivery of key policy outcomes. In this regard, Marcello Estevão (2020) pointed out that a shift in focus is required from ‘simply processing taxpayers’ data to proactively improving compliance, policies and efficiency’. The successful pursuit of key policy objectives such as administrative efficiency, broadening the tax base, reducing the compliance burden and establishing transparency and trust is dependent on digital platforms. In assessing African tax administrations from this perspective, Mick Moore found that digital technologies are generally not maximised to their full potential. Technologies are often used in a disjointed manner where the emphasis is on taxpayer facing actions rather than internal control objectives, and technologies remain under-utilised in pursuit of revenue collection, improved taxpayer service and oversight (Moore, 2020). In addition, Moore identified that technologies are not maximised for purposes of statistical and risk analysis to identify categories of non-compliant taxpayers.

The World Bank further points out that, globally, the introduction of electronic filing (e-filing) and electronic payment (e-payment) have made it easier for taxpayers to submit their returns and to pay taxes over the internet (The World Bank, 2020). Other benefits brought about include easier tax preparation processes, prepopulating of returns with data already in the administration’s possession and significant reductions in compliance turnaround times (World Bank, 2020). The World Bank further highlights that even though 97 per cent of advanced economies use such features, only 17 per cent of sub-Saharan African (SSA) economies make use of these technological features in comparison to high-income countries (World Bank, 2020). The absence of technological features complicates the tax system which can become

a major determinant of foreign direct investment (FDI) in that the number of payments and the allowed timeframe for compliance with tax obligations is indicative of positive or negative FDI flows (World Bank, 2020).

What then are the constraints that are holding back this digital transformation? According to Owens, some are institutional, some are budgetary, others are legal and political while the human factor also plays a role: changing mindsets; appointing and promoting officials who are not afraid of disruptive technologies and have the vision and energy to use it (Owens & De Jong, 2017).

This article analyses the progress made by African tax administrations in adopting technologies to streamline tax collection functions. Part I of this article provides an overview of tax administration functions that benefit from automation; part II considers monitoring tools to evaluate progress in automation while part III provides a synopsis of the successful adoption of technologies by African countries that enable improved taxpayer service, taxpayer education and enforcement. Finally, part IV highlights some considerations for the way forward in adopting technological solutions.

II TAX ADMINISTRATION FUNCTIONS THAT BENEFIT FROM AUTOMATION

In *The Nuts and Bolts of Revenue Administration Reform*, Gill identifies the standard suite of modules for customs and tax automation to include: taxpayer registration; processing of declarations; processing payments and revenue accounting; recovery of tax arrears; risk analysis and case selection; access to electronic third-party data systems; systems for administrative actions; case management and tracking; electronic declaration filing and payment of taxes and duties electronically; systems to detect non-filing, stop filing and non-payment of taxes as well as other systems that achieve a paperless environment (Gill, 2003). These functions need to be reflected as the high-level requirements for IT systems that support tax administrations. Cotton et al categorise these functions as follows:

- i) A taxpayer registration system that issues and maintains a taxpayer identification number (TIN), validates numbers, provides a holistic view of the taxpayer, integrates with other data, includes storage and retrieval systems, processes payments, processes deregistration, allocates unique identifiers (legal entities) and supports segmentation.
- ii) A payments processing system that captures identification numbers, tax type, payment period, payment type, and payment amount; has automatic interfaces and ability to process payments; generates management information for purposes of payment reconciliations;

- revenue reporting; statistics; reports on suspense account activities; and an audit trail of accesses and any adjustments made.
- iii) A form (tax declaration/tax return) for all the different tax types that include business license/form type, need to be processed through a system that supports the principles of self-assessment; that can run comparisons and arithmetical calculations; that allows for reconciliation of third-party data and that provides for configuration to accommodate new tax types or data fields; generates electronic receipts; issues assessment notices, raises default assessments, archives and produces management information/audit trail.
 - iv) A taxpayer and revenue accounting system that maintains taxpayer accounts (holistic view); calculates due dates and allows for amendments/queries; allows taxpayers to view their accounts through web access; automatically adjusts penalties and interest; ageing of debts; facilitates archiving; offsetting across tax types and provides a general statement of accounts.
 - v) An events calendar capability that associates taxpayers with relevant tax type; generates returns; determines due dates in accordance with laws and administrative arrangements; allows for extensions and generating of demands; allocates cases for follow up through a case management and tracking system.
 - vi) An arrears management system that detects cases with outstanding debt that is payable; generates demands; provides a holistic view of taxpayer debts; updates taxpayer compliance history, issues demands and allocates cases; prioritises debts; provides for write off and generates management information (such as debt category, age, status of cases, and so forth).
 - vii) A case management system for workflow (including debt) management, disputes, outstanding returns, responses to taxpayer queries; prioritisation of cases in accordance with risk criteria; case allocation; multiple cases that involve the same taxpayer are highlighted across different taxes; actions taken are recorded; standard letters and notices initiated by case officer are systems generated; and case statuses are maintained, (for example, pending, finalised) The system also flags follow-up cases and keeps case history indexed by TIN.
 - viii) An audit support system that performs financial analysis on tax returns and other data to allow for automated audit case selection; case prioritisation and allocation; provision of information for the preparation of the annual audit work plan; provision of tools to assist with audit activities (for example, software for analysis of taxpayer accounting records, links to other third-party information and material for referencing, remote work options from a taxpayer site;

- capturing audit activities and outcomes; updating of risk criteria/ indicators with audit feedback data; management information on audit turnaround times and success rate of selected cases is generated and an audit trail is maintained).
- ix) A taxpayer services system that assists in the development of taxpayer services products; that serves as a rulings database for taxpayers and tax administration staff, that contains public information, frequently asked questions and answers thereto; ensures that information and downloadable forms on the department's website are accurately maintained; permits taxpayer interaction through the website allows channel options for communication (print, email, text, electronic message) receives and records taxpayer correspondence (including disputes objections and appeals) which is then managed through the case management system.
 - x) A revenue reporting and forecasting system for providing assessed revenue assessed reports by tax type on a national basis (segmented by industry and sector type) with the ability to conduct further in-depth analysis; provides real-time reporting to allow for tracking of revenue collections.

The benefits of such automation include, for example, that basic information about taxpayers is allocated to a unique TIN, which enables the administration to communicate electronically with the taxpayer, track taxpayer liabilities and payments, and act timely with tax recovery. Importantly, it allows for analysis of data on compliance behaviour which in turn informs case selection. Increased automation of third-party data and access thereto, allows for better risk analysis, targeting processes and improved quality of case referrals to audit, investigations, post-clearance audit and customs frontline officers. Automation also improves administrative actions related to interest, penalties, and refunds and, by channelling the filing of declarations through tax practitioners and customs brokers, transparency and accountability are improved.

Further benefits include improved governance and a lower incidence of bribery (World Bank, 2020). The World Bank points out that higher tax compliance costs are often associated with large informal sectors (typically found in Africa), more corruption and less investment. Besides improving efficiency, the automation of key processes minimises physical interaction between taxpayers and tax officials and removes cash offices, which can limit rent-seeking. World Bank data indicate that countries with fewer types of tax payments are associated with lesser perceptions of corruption in the public sector. Automation can also include measures to increase the effectiveness of Mutual Agreement Procedures (MAP) and to improve the efficiency of indirect taxes such as VAT or environmental levies: tax liabilities are triggered by

key events (e.g., the issuing of a permit; the conclusion of a contract, product manufacture, goods or service delivery and by imports and exports) that need to be recorded and stored securely.

The downside of automation is that it is a costly endeavour over the short term, and in many countries, the process has stalled due to budget limitations (DIFD, 1998). This results in situations where modules implemented are incomplete and do not allow the administration to benefit from the initial steps taken in automation: for example, a module is implemented that provides for the capturing of taxpayer data, but no provision is made for implementing a module that allows for the extraction of data for purposes of risk analysis. Another negative consequence of automation is that transactional data may be irretrievably lost when the switch is made from a legacy system to a new system. In such scenarios, the administration needs to gather at least two years' transactional data after the switch to the new system before it can do meaningful risk analysis on transactional data. In the absence of strong risk and intelligence units that can gather meaningful data from other sources, administrations may find themselves rudderless in establishing non-compliance patterns amongst high-risk taxpayers and unable to respond with directed service and education offerings. With such limitation in place, administrations may, as Mick Moore puts it, develop a 'registration obsession' that seeks to place all potential taxpayers on the register (a key feature of automation as discussed in part III) irrespective of the limited of ever collecting taxes from a bulk of small scale taxpayers (Moore, 2020).

III MONITORING TOOLS TO EVALUATE PROGRESS IN AUTOMATION

There are a variety of tools available to tax administration that measure progress in tax reform. In this regard, Frode Lindseth identified several such revenue administration analytical assessment tools as well as data collection and reporting tools. These tools include the Organization for Economic Co-operation and Development (OECD), the Forum on Tax Administration (FTA), Maturity Models, the Revenue Administration Gap Analysis (RA-GAP); Tax Administration Diagnostic Assessment Tool (TADAT); Tax Administration Fiscal Blueprints (FB); Tax DIAMOND (Development of Implementation and Monitoring Directives for tax reform); the African Tax Administration Forum (ATAF) African Tax Outlook (ATO); ATI Indicators; International Survey on Revenue Administration (ISORA) and the United States Agency for International Development (USAID) Collecting Taxes Database (CTD). In assessing these multiple tools, Lindseth found that similarities exist in the tools' design, methodology and active involvement required from the recipient tax administration.

While some countries have used a combination of tools to benchmark their progress, for example, Uganda, many prefer the International Monetary Fund (IMF) TADAT that sets out key compliance outcomes that should result from improved technology use in tax administrations (Lindseth, 2020). One of the reasons Akol et al adopted TADAT is that it fits neatly with an administration's desire to improve tax administration by implementing internationally recognised good practice (Akol, 2019).

The TADAT framework provides a standard framework for the assessment of the health of key parts of a government's tax administration system and its maturity levels. This is done by taking global good practices into account which, in turn, inform how the TADAT assessments can help to identify relative strengths and weaknesses in tax administrations; to provide an objective view of the administration's performance which all stakeholders can further interrogate; to set a reform agenda; to facilitate reform via management and implementation of key priorities, and to monitor progress through repeat assessments (TADAT, 2019).

TADAT assessments are also conducted at a subnational tax level since many subnational tax administrations (for example, municipalities) contribute a significant percentage of the subnational entity's total tax revenues that do not constitute subsidies from the national budget. These are referred to as 'own source revenues'. The assessment processes of national and subnational tax administrations take into account the same assessment criteria (TADAT, 2019).

Aspects covered by TADAT include the timely payment of core taxes that is measured by a field enquiry that seeks to identify which electronic payment methods are available to taxpayers and the degree to which e-payment promotion actions are planned. It also covers the use of digitalisation in integrity programmes, internal assurance mechanisms and efficient revenue management.¹ TADAT assessments have been conducted for the countries listed in Table 2 below:

To date, performance assessments have been cleared for publication by the respective country authorities of Burkina Faso, Liberia, Togo, Uganda, and Zambia. Major findings for Burkina Faso indicate that taxpayers cannot file online or access their tax account and that actual stock and flow cannot be measured (TADAT, 2021). Findings for Liberia include the payment and on time filing ratio cannot be determined because of data reliability issues; weak data analysis to identify non-filers or monitor inaccurate reporting; significant delays in revenue account reconciliation, compromise the revenue accounting system; actual stock

¹ TADAT. 2019. Tax Administration Diagnostic Assessment Tool (TADAT) Field Guide 73–76, 113, 120, 124. These are respectively covered under Performance Outcome Area 5 – Timely Payment of Taxes, Performance Outcome Area 8 – Efficient Revenue Management and Performance Outcome Area 9 – Accountability and Transparency.

Table 1: *Key features of automation in core functions*

Taxpayer registration	Taxpayer declarations	Arrears management	Compliance management
<p>A national TIN is allocated <i>Use of check digits to verify TIN</i> Associated entities and related parties of the taxpayer are linked. <i>The risk of duplicated or conflicting records is mitigated.</i> Interfaces with other IT subsystems to support filing and payment enforcement. <i>Whole-of-taxpayer view (i.e., across all core taxes) is provided to frontline staff.</i> Deactivation or deregistration of taxpayers and archived information in a way that can be restored if needed is provided for. <i>Registration-related management information is provided for.</i> An audit trail of user access and changes made to taxpayer registration data is provided for. <i>Secure online access to taxpayers to register and to update registration details.</i></p>	<p>Processes tax declarations for core taxes. <i>At time of filing, automatically checks the taxpayer's identity against the registration database, records the date of filing, performs arithmetic checks, records the tax liability, and stores declaration data.</i> Receives electronically filed declarations and generates an electronic receipt for each e-filed declaration. <i>Provides a consolidated picture of a taxpayer's filing history across all core taxes.</i> Identifies and reports on all instances where a tax declaration is expected from the taxpayer, and automatically generates the relevant declaration in paper or electronic form (inclusive of TIN and other identification details) for the taxpayer to complete and file. <i>Records an extended due date for filing where this has been approved.</i> Automatically generates reminders and demand notices to taxpayers. <i>Allocates non-filer cases to filing enforcement staff via a case management system.</i> Generates assessment notices, including estimated assessments. <i>Produces management information.</i></p>	<p>Identifies and reports all instances where amounts have not been paid on time. <i>Automatically generates reminders and demand-for-payment notices.</i> Provides a consolidated picture of a taxpayer's total tax arrears across all core taxes. <i>Prioritises arrears cases based on risk criteria.</i> Allocates cases to arrears collection staff via a case management system. <i>Applies taxpayer' profiling analytics which predict the most effective action to achieve payment of the debt based on known circumstances and behaviour.</i> Generates management information (for example, statistical reports on the value and age of arrears for each core tax, the number of debtors, value, and number of cases subject to legal recovery action, time payment arrangements, and write off).</p>	<p>Advanced analytics using large data sets (for example, predictive models, clustering techniques, and scoring models) to determine the likelihood of taxpayers making full and accurate disclosures of income. <i>High-volume automated cross-checking of amounts reported in tax declarations with third-party information.</i> A consolidated view of the taxpayer's compliance history across all core taxes. <i>Centralised audit case selection using analytics to select the highest risk cases within a target population of taxpayers.</i> An automated audit case management subsystem. <i>Provides real-time compliance history in support of cooperative compliance</i></p>

Source: TADAT 2019.

Table 2: *Sub-Saharan African countries with TADAT assessments (2013–2020)*

Angola	Ethiopia	Namibia	Seychelles
Benin	Ghana	Liberia	Sierra Leone
Burkina Faso	The Gambia	Nigeria (Kanu)	South Africa
Burundi	Kenya	Nigeria (Jigawa)	Tanzania
Cameroon	Madagascar	Nigeria	Tanzania (Zanzibar)
Côte d'Ivoire	Malawi	Republic of Congo	Togo
Democratic Republic of Congo	Mauritius	Rwanda	Uganda x2
Eswatini	Mozambique	Senegal	Zambia x2
			Zimbabwe

Source: *TADAT Secretariat (TADAT, 2021)*

and flow cannot be determined; oversight weaknesses and control of IT systems and almost all system functions are replicated manually (TADAT, 2021). The information system of the Togo Revenue Administration was found not to allow automation of certain essential functions of a tax administration (such as reporting, tax control, litigation and tax revenue collection) and that the system does not account for control and completeness of recording of tax revenues (TADAT, 2021).

For Uganda, findings include that the data integrity of the taxpayer registration database plays a sufficient supporting role that allows for taxpayers and tax intermediary interaction; that e-payment options and other electronic services are effectively rolled out; that the level of intelligence collection, research and cross-checking of data to identify compliance risks that uses an automated risk engine, is comprehensive; that although the revenue administration operates a robust accounting system, it does not interface directly with revenue accounting system of the Ministry of Finance; the system provides an audit trail of user access and changes made to taxpayer data and taxpayers can update their demographic details securely online (TADAT, 2021). In the case of Zambia, it was found that although the TaxOnline system provides a solid basis for taxpayer accounting and allows for high levels of filing and payment, data integrity contains weaknesses that do not make bulk data analysis possible. As is the case with Uganda, the system does not interface with the Finance Ministry (TADAT, 2021).

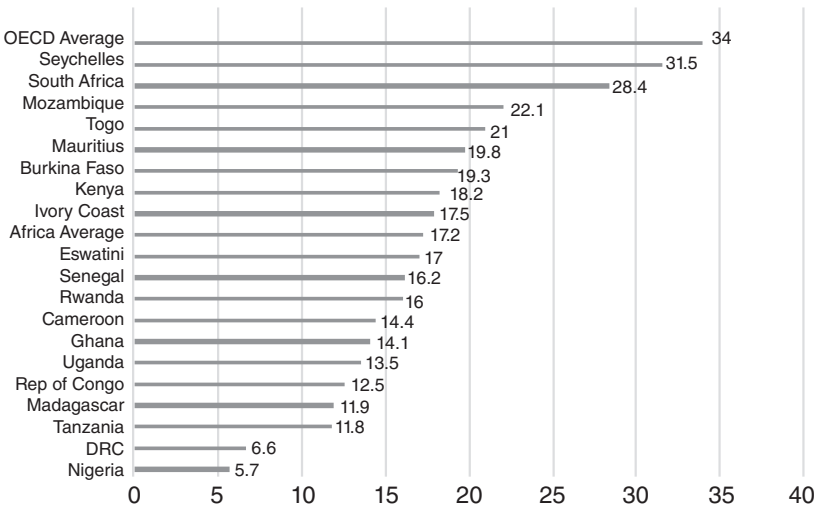
IV PROGRESS OF AFRICAN COUNTRIES IN AUTOMATION

In their assessment of the effectiveness of the TADAT framework in Uganda, Doris Akol et al found that TADAT highlights the use of technology in modern tax administration and that one of the challenges for developing countries is in the use of systems for cross-checking of data and monitoring of declarations (Akol, 2019). The challenge is further compounded by:

- i) poor usage, uninformed choice of a system;
- ii) management of the IT system by people that do not understand IT since skilled IT staff cannot be recruited or retained and choices of IT systems are influenced by external parties;
- iii) purchase of systems is made corruptly and that individuals within the administration may prefer less accountability and transparency that a well-functioning IT system may bring about (Moore, 2020).

Despite these many challenges, the World Bank Doing Business data of 2018 showed that using online systems for filing and payment of taxes led to gains in efficiency in several countries in sub-Saharan Africa. These include Côte d’Ivoire, Kenya, Mauritius, and Togo. As is illustrated below, the tax to gross domestic product (GDP) ratios for these countries is also above the African average, which has, since 2015 plateaued at 17.2 per cent.

Table 3: Tax to GDP ratios 2017



Source: OECD; World Bank.

Kenya is generally viewed as a success story in automation through the implementation of a mobile-phone-based financial services platform (initiated through a money transfer system, M-Pesa), which has been applied for various functions such as e-commerce, tax payments and revenue administration (Ndung'u, 2019). By implementing the iTax system and the Kenya Revenue Authority (KRA) M-Service, a single view of the taxpayer was enabled, reconciliations improved, data matching and online banking reports were enabled, and real-time collection of revenue was achieved. Automation strengthened enforcement mechanisms and third-party data is available through the integration with the Integrated Financial Management Information System and Central Bank of Kenya. The use of digital platforms allowed the KRA to increase transparency in its operations and reduce opportunities for corruption. In addition, with automation, the cost of revenue collection has steadily declined since 2011. KRA reforms aided improvement in the accuracy of taxpayer data and simplification of tax processes, thereby making it easy to comply and minimising opportunities for fraud. Further features include cost-effectiveness, improved confidentiality of taxpayer data and rapid processing of declarations (Ndung'u, 2019). Last, but not least, revenue collections have shown consistent growth and financial inclusion has led to the widening of the tax base. To address tax fraud, the KRA has introduced Accounting Command Language to manipulate data and to look for invoices of medium and large taxpayers in high-risk sectors such as construction, wholesale and retail that are either repeated or skipped (OECD, 2017).

Another leading African tax administration in digitalisation is the South African Revenue Service (SARS). Its technological drive with commensurate risks is neatly summed up in its Annual Plan of 2019-2021 (SARS, 2019):

'SARS needs to be "plugged" into the economy. The emergence of new technologies such as Block-Chain, Artificial Intelligence and Cloud Computing provide new possibilities for improving the efficiency and effectiveness of SARS' administration efforts. In an environment of big data and predictive analytics, the ability to identify risks, and drive evidence based decisions has a huge impact on improving compliance. If implemented appropriately such technologies could yield savings in Information Technology (IT) infrastructure costs and data accessibility and usage for SARS, businesses and the public at large. These technologies will however also introduce new risks for SARS. The emergence of digital currencies and continued proliferation of decentralized value chains as well as new business models, also redefines

tax policy and administration globally. The risk of cyber-crime also increases exponentially.’

In 2021, SARS announced that R3 billion (approximately \$206 384 160) will be spent on, amongst others, the expansion and increase in the use of artificial intelligence and machine learning algorithms to enhance data matching and a digital platform through which taxpayers can easier engage with the administration (BusinessTech, 2021). This spend emphasises the importance of electronic services in facilitating a transparent platform that allows government and taxpayers to interact through a system that is less vulnerable to political interference. It also brings benefits of reduced cost of compliance, simplification of the filing process and reduced preparation time and errors. By freeing up human resources from verification and checking activities, freed up personnel can be directed to taxpayer service – often a very neglected area due to the wrongly held perception that automation will allow for the processing of all queries that taxpayers may have. For example, in 2019, complaints about service failings made to the South African Tax Ombud jumped by 38 per cent and most related to administrative and process issues (Fin24, 2019).

While automation plays an important role in improving tax administration, the tax structure, the fiscal framework and the economic structure of a country underpin what is possible from a revenue collection perspective. A good example is South Africa, which, since 1989 has had an average tax to GDP ratio² of around 25 per cent. In 2017, it stood at 28.2 per cent (OECD, 2020).³ In comparison to most SSA countries, South Africa has a diversified economy and its tax structure differs from most other SSA countries – especially with the large role played by personal income tax which is on par with most OECD countries. While most African countries perform well with VAT, automation can vastly improve the efficiency of the VAT system as is discussed in part V(d) of this article.

(a) Fiscal decentralisation

A platform to collect local own source revenue can be provided for through developing integrated revenue collection systems. For example,

² The tax-to-GDP ratio is measured as tax revenues (including social security contributions paid to general government) as a proportion of gross domestic product (GDP).

³ The tax-to-GDP ratio in South Africa increased by 0.7 percentage points from 28.4% in 2017 to 29.1% in 2018. In comparison, the average for 30 participating African countries increased by just under 0.1 percentage points over the same period and was 16.5% in 2018. Since 2010, the average for the 30 African countries has increased by 1.4 percentage points, from 15.1% in 2010 to 16.5% in 2018. Over the same period, the tax-to-GDP ratio in South Africa has increased by 3.4 percentage points, from 25.7% to 29.1%. The highest tax-to-GDP ratio in South Africa was 29.1% in 2018, with the lowest being 22.4% in 2000.

with the rollout of the Tanzania Local Government Revenue Collection Information System (LGR CIS) in Arusha City Council in Tanzania, local revenues have been significantly increased. McCluskey et al ascribe these increases to the reduction of revenue leakages (carbon slipping associated with the manual system); accuracy in the revenue database and the ability to identify defaulters timeously (McCluskey, Huang, Doherty, Franzsen & Fish, 2018). Similar case studies are available for Kenya in which it is shown that automation drastically improves country revenues as well as transparency in the collection processes, for example, Ngeno found that automation, together with 'integrated internal control process and efficiency and human resource management' have a positive effect on revenue collection and accounting in Kericho County (Ngeno, 2018), while Madegwa, Makokha and Namusonge, found that automation of revenue collection in Trans Nzioa county greatly improves turnaround times, compliance, and reduces payment costs (Madegwa, Makokha & Namusonge, 2018). Automation also leads to significant improvement in property tax collection if sufficient input data is available, as pointed out by McCluskey et al (McCluskey, Franzsen, Kabinga & Kasese, 2018). In many counties, however, little steps toward automation have been made, but various local taxes are still paid and collected in cash.

V THE WAY FORWARD

In their assessment of the effectiveness of the TADAT framework in Uganda, Doris Akol et al found that TADAT highlights the use of technology in modern tax administration and that one of the difficulties for developing countries is in the use of systems for cross-checking of data and monitoring of declarations (Akol, 2019). The challenge is further compounded by poor usage, uninformed choice of a system, management of the IT system by people that do not understand IT, skilled IT staff cannot be recruited or retained, choices of IT systems are influenced by external parties, purchase of systems is made corruptly and that individuals within the administration may prefer less accountability and transparency that a well-functioning IT system may bring about (Moore, 2020). Despite these many challenges, progress was made by several countries through deploying online systems as pointed out by the World Bank (as shown in part IV above).

While automation is a long-term investment, there are various additional steps that tax administrations can take to improve revenue collection. The first step is getting data quality to levels that allow for cross-referencing and bulk data matching, the second is ensuring that informed technology selection choices are made, the third is the implementation of international standards that make a routine exchange

of information possible and the fourth is ensuring that automation in support of local tax collection is made possible.

(a) *Improve data quality*

Data held by a tax administration reflects past events and the quality thereof can provide an understanding of trends and patterns across multiple data sources. The ability to further interpret such data through intelligence processes can provide valuable insights into future compliance trends (OECD, 2004). The types of data held should therefore include tax return data that includes financial statement information; industry classification, payroll data of employers data, third-party information from banks (including interest details), personal pensions data, company register data; other public data, in particular, open-source information (company publications, news alerts); social media (lifestyle); benchmarking data (supporting interpretative and analytical work on net and gross profit norms for trade sectors, the ratio of expenses to turnover; income averages of neighbourhood families; audit and compliance improvement programme feedback. To gain insights into taxpayer behaviour, tax administrations are required to match and link together the data from these and many other disparate sources. This requires the use of advanced technologies to make comparisons from large and often, the disparate volume of data. Key questions for administrations are whether their data matching produces results such as:

- i) linking corporate income tax (CIT) filers to major shareholders;
- ii) linking companies to VAT transactions; payroll and import/export transactions;
- iii) linking companies to foreign affiliates and non-arm's length foreign transactions;
- iv) linking business owners to their spouses and children;
- v) statistical data correlating of data with taxpayer compliance;
- vi) access to data on beneficial ownership.

Best practice dictates that quality assurance of data is an ongoing requirement to minimise keying errors during tax return capture; that data should be cleaned as near to its source as possible to ensure that different data users do not run into repeated data integrity issues, and that risk identification should be backed up by properly integrated validation processes.

Systems should provide access to various data sources simultaneously and it is therefore important that relational databases and data warehouses can facilitate these basic elements of the risk identification and assessment process. (OECD, 2004). Data analysts can then apply tools and methodologies to make inferences that guide risk identification

and prioritisation. In the absence of a single view and excessive use of localised excel files, situations arise where staff cannot do routine cross-checking, taxpayers are registered multiple times under two or more TINs, and actual tax payments are not visible to auditors and other users.

(b) *Use technological tools and international standards that support data transparency*

The implementation of the international standards on transparency and exchange of information (EOI) for tax purposes is a useful tool to address illicit financial flows (IFFs) and their enablers (for example, money laundering and corruption) (OECD, 2020). Intergovernmental cooperation aimed at addressing cross-border tax evasion has grown rapidly over the past decade. The key standardised components of intergovernmental cooperation are the Exchange of Information on Request Standard (EOIR) and the Automatic Exchange of Financial Account Information Standard (AEOI). The AEOI standard requires financial institutions to report financial account information of non-residents to their tax administrations, which is then able to allow for automatic EOI with the tax administrations of account holders' country of residence under the globally agreed Common Reporting Standard (CRS). While AEOI provides bulk financial information to tax administrations without an upfront request, EOIR enables follow-up requests on any suspicious information reported. The value of intergovernmental cooperation has resulted in five African countries identifying nearly \$12 million in additional tax in 2019 as a direct consequence of EOI. For the period 2014 to 2019, eight countries in Africa identified a notable \$189 million in additional taxes. Implementation of AEOI by African countries is part of the tax transparency agenda in Africa and one of the main objectives of the renewed mandate of the Africa Initiative (AI).⁴ As evidenced by country experience, administration can drastically improve their collection capability by the adoption of the standards and implementation thereof.

(c) *Choosing technology for automation*

An IT strategy should be tailored to the needs of the tax administration through an objective assessment. This entails an understanding of the external environment wherein the administration operates: that is, what are the levels of IT skills and infrastructure like in the country; what

⁴ The Africa Initiative is a regional programme launched in 2014 by the OECD Global Forum on Transparency and Exchange of Information for Tax Purposes (the Global Forum), its African members and various partners. It aims at unpacking the benefits of tax transparency and exchange of information (EOI) to fight tax evasion and other illicit financial flows (IFFs) and serve African countries' development.

are the levels of automation of the business community (for example, payroll, banking records, transaction data, pension fund and medical aid data, and so forth); to what extent are government agencies automated (property register, company register, vehicle licencing, immigration; deeds office); to what extent is there wide-ranging and continuous electricity supply; how stable is the internet and how broad is mobile phone coverage; and what role will technology play in the further development of the country. Answering these questions will determine the choice of system or, where mature systems are already in place, the enhancements can be done to existing systems (Cotton & Dark, 2017).

Table 4: *Comparative benefits of an off-the-shelf system and self-build systems*

Off-the-shelf system	Self-build system
1. Cost is more predictable.	Cost can be estimated with a high likelihood of over-run
2. Product is known and tested.	Outcomes are unknown and design and build process can be long and dragged out.
3. Time frame for implementation is short. Lower risk since the application of the product can be gleaned from operational application in another country's administration.	Heavy testing requirement.
4. The hardware requirements and performance parameters are known.	Higher risk profile because product is unproven.
5. Product accompanied with vendor warranty.	Hidden costs are associated with development in the design/build/test processes.
6. Usually requires single procurement process.	Faults are the responsibility of the administration.
7. Business process compromises can be required, but a good system should already embody good practice.	Likelihood of multiple processes for individual components/services.
8. Usually requires single procurement process.	Can be tailored to business process requirements although risk of reintroducing existing poor practices.
9. Vendor supplies all capability to install, configure and support.	BPR is conducted prior to system design to establish detailed user requirements.

Off-the-shelf system	Self-build system
10. Business Process Reengineering (BPR) is usually conducted in parallel with system installation.	Own cost.
11. Vendor can supply upgrades and run/maintenance over life of system. Can be implemented progressively with core functions at start and expansion later.	Administration responsible for developing, maintaining and retaining staff and skills.
12. Documentation readily available and updated.	The development team outputs (requires discipline to maintain documentation and change control) largely determine further documentation and maintenance deliverables.
13. Can be evaluated before purchase.	Can only be evaluated after completion.
14. Flexibility may be limited by vendor.	Only limitations to flexibility are capability, finance and technical issues, capability.

Source: (Cotton & Dark, *Use of Technology in Tax Administrations 2: Core Information Technology Systems in Tax Administrations*, 2017) (Cotton, Dark, Menhard, Ryan & Gupta, 2017)

A crucial aspect in selecting appropriate technology is that such a selection should not constrain future tax policy choices.

(d) Digital ledger technologies (DLT)

A distributed ledger is described as ‘a database that exists across several locations or among multiple participants and is decentralized to eliminate the need for a central authority or intermediary to process, validate or authenticate transactions’ (Owens & De Jong, 2017). All those participating on the distributed ledger can see all of the records and the information that is captured on a particular dataset is both auditable and verifiable. A distributed ledger promotes transparency and puts control of all its information and transactions in the hands of the users. In addition, processing time and operating costs are significantly reduced while back-office efficiency, security and automation are facilitated (TRADEIX, 2021). Owens and De Jong (2017) pointed out some benefits of DLT for taxation that include:

- i) A reduction in tax fraud through increased transparency and immutability of records can significantly contribute to tax compliance.
- ii) Real-time tax administration and compliance are enabled.

- iii) Registries for advanced tax rulings and advance pricing arrangements can be created for the exchange of information purposes.
- iv) Streamlined transfer pricing operations throughout multinational enterprises' accounting systems that reflect transactional records for audits.
- v) Better streamlining of payroll information and calculation and payment of taxes.
- vi) Blockchain is an example of digital ledger technology that can be applied to achieve the objectives stated above. While blockchain requires a sequence of blocks, distributed ledgers do not require such a chain. Blockchain technology⁵ can potentially produce significant modernisation in tax systems by enabling automation of business rules by leveraging 'smart contracts.'⁶ Benefits brought about by introducing Blockchain include efficiency gains in audits; complementing existing systems through a single transparent view of data; removing duplication; reducing complexity and compliance costs because less reconciliation will be required, improving collections and refund processes (Baisalbayeva et al, 2019).

Like any modernisation process, the implementation of blockchain solutions is a step-by-step process that will take time. For tax administrations wanting to implement blockchain it will require that they have already implemented e-invoicing, have a single depository; use a split-payment method to isolate VAT amounts from the transaction amounts and have created a Standard Audit File for Tax (SAF-T) (Baisalbayeva et al, 2019).

Blockchain can potentially support direct taxation by contributing to the establishment of a global standard for tax reporting; provision of third-party assurances, increased information exchange between administrations (through cloud-based platforms) and facilitating multi-jurisdictional joint audits. For indirect taxes such as VAT, split-payment

⁵ 'A blockchain consists of several blocks that merge and link to each other until a block 'chain' is formed. Each block identifies the previous block using a hashing function that forms a single unbroken chain set. When a piece of information has already been recorded in the blockchain database, it is difficult to delete or modify that data. The blockchain uses a decentralized and distributed ledger method referred to as a distributed ledger. A distributed ledger is a record that contains all transactions in a network and can be accessed by all parties in the network.' J. Open Innov. Technol. Mark. Complex. 2020, 6, 156 4 of 27 distributed ledger method referred to as a distributed ledger. A distributed ledger is a record that contains all transactions in a network and can be accessed by all parties in the network.

⁶ Smart contracts are programs stored on a blockchain that run when predetermined conditions are met. They typically are used to automate the execution of an agreement so that all participants can be immediately certain of the outcome, without any intermediary's involvement or time loss. (What are smart contracts on blockchain? <https://www.ibm.com>).

systems can be joined with enabling technology for real-time auditing and compliance; smart contracts can include mandatory pre-described software for taxpayers; the requirement for traditional tax returns filings can be reduced; and, at the country level, the fragmentation of compliance processes can be reduced (technology, language, controversy).

Setyowati, Utami, Saragih and Hendrawan point out that blockchain is considered to be:

‘a revolutionary technology and one of the best innovations after the internet because of its many benefits, such as speeding up transaction completion, reducing the risk of fraud, increasing transaction auditability, and increasing the effectiveness of supervision.’

In analysing blockchain technology applications for VAT in Indonesia, the authors identify some challenges and obstacles to the adoption of blockchain technology. These include legality issues, security and usability issues, political dimensional issues and issues relating to conflict of values (Setyowati, Utami, Saragih & Hendrawan, 2020). Setyowati et al, stress the importance of involving all stakeholders in the implementation of blockchain technologies.

VI CONCLUSION

It is clear from country experiences in Africa that automation plays an important role in improving tax administration. However, tax structure, the fiscal framework and the economic structure of a country as well the receptiveness of administrations to change often limit automation potential. From a revenue collection perspective, it is therefore critical that whichever choice in automation is made, it ensures that core functions run effectively, that data captured is usable and that additional tools in identifying revenue sources are utilised. In this regard, John Tapscott⁷ pointed out that technology has infused itself in what we do, and that the world is now moving from an internet of information to an internet of value. This has a significant impact on decisions for continued investment in legacy systems. Therefore, it is critical to develop a digital roadmap with a target architecture.

⁷ Leading writer and thinker on the digital economy and co-author of *Wikinomics: How Mass Collaboration Changes Everything*.

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