THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

TaxTech:
Leveraging digitalization to improve tax compliance and revenue
mobilization

Leveraging digitalization to improve tax compliance and revenue mobilization

Table of Contents

Abbreviations

BPT   Business Process Transformation
CIT   corporate income tax
COTS   commercial off-the-shelf
CRM   compliance risk management
DRM   domestic resource mobilization
GDP   gross domestic product
GST   general service tax
HR   human resources
HRM   human resource management
HQ   headquarters
ICT   information and communication technology
IT   information technology
ITAS   Integrated tax Administration System
ITMS   Integrated Tax Management Systems
KPI   key performance indicator
LTU   large taxpayer unit
MIS   management information system
MNE   multinational enterprise
MOF   Ministry of Finance
MoR   Ministry of Revenue
MSME   micro, small, and medium enterprises
MTU   medium taxpayer unit
OCR   optical character recognition
OECD   Organisation for Economic Co-operation and Development
PFM   public financial management
PIT   personal income tax
RMS   risk management system
SIGTAS Standard integrated Government Tax Administration System
SME   small and medium enterprises
SRA   Systems Readiness Assessment
STU   small taxpayer unit
TA   technical assistance
TIN   Taxpayer Identification Number
VAT   Value added tax

Key Messages

The importance of technology in implementing tax policy

➢ Tax policy cannot deliver the government's desired goals without good tax administration.
➢ Good tax administration digitalisation reduces compliance costs for both taxpayers and tax administrations, reduces time needed to meet tax burdens and provides certainty to taxpayers, increasing economic efficiency.
➢ Use of technology for tax administration is thus not a choice – it is a must.
➢ Technology in tax administration has improved significantly since the 1990's, enabling both cost savings and improving capacity.
➢ The most advanced tax administrations are integrating tax compliance within ordinary business processes of taxpayers, such as through e-invoicing.

Planning and management of tax administration digitalisation

➢ Tax administration digitalisation is a continuous process of evolution rather than any single upgrade.
➢ The legislative framework may need to be updated to ensure that automation plans are consistent with the laws, especially tax laws, of the country.
➢ The tax administration must first define and document its business processes before seeking to automate them, as has been conducted through MoR's BPT Plan.

Implementing a digitalisaton programme

➢ A review of organizational structure and responsibilities may be needed to ensure consistency with updated business processes.
➢ A structured Tax Technology Plan, with risk mitigation, and prioritization of deliverables is essential.
➢ In parallel, data standards and legacy data cleanup are needed to ensure good data quality, without which any automation is unlikely to produce optimal results.
➢ Independent Verification and Validation of deliverables is essential.
➢ Good internal and external communications regarding the changes are needed.

Enhancing digitalisation within tax administration

➢ There are good experiences within other tax administrations in comparable countries, from which a speific country can learn.
➢ Particular risks that potentially arise, e.g. the development model adopted in the country under consideration, should be examined.
➢ For countries at the early stage of their digitization journey should aim to first achieve automation of core processes before seeking to adopt leading edge technologies such as data science driven analysis, autofill of returns and machine learning.

1. Introduction

1.1 Regional conference on digital technology

The World Bank, in conjunction with the Ethiopia Federal Government Ministry of Revenues, organized a two-day conference on the role and status of digital technology in tax administration within East and Southern Africa, under the theme "TaxTech: Digital Technology Solutions for Tax Administrations". The conference, held from 22nd to 23rd April, 2024 in Addis Ababa, Ethiopia, drew participants from Ethiopia, Kenya, Malawi, Nigeria, Rwanda, Somalia, South Sudan, Uganda, Zambia, and Zimbabwe, as well as the IMF, the UK Foreign, Commonwealth & Development Office, and international tax experts. The participants exchanged experiences and lessons on how to leverage digitalization to improve tax compliance and revenue mobilization.

The topics discussed included
a)   Leveraging digital technology to improve taxpayer experience and enforcement, i.e. how revenue administration digitization fits the "whole of government" service delivery.
-      Digitalization in taxpayer services, with an emphasis on taxpayer experience.
-      Automation of risk-based tax administration, including excise administration.
-      Role of revenue department leadership.
-      Need for visible, measurable returns.
b)   Importance of good project management in the implementation of ICT solutions – business process redesign for digital tax administrations, i.e. developing good business requirements; sequencing process improvements and aligning HR for digitalized tax administration; aligning project tasks with the IT strategic plan; and procurement.
-      Practical aspects of deploying digital technology, i.e. decision points and options.
-      Comparative country experience, featuring a panel of tax administrators.
c)   Models of tax administration software solutions.
-      Foundations of successful digital change and growth.
d)   Cybersecurity.
e)   The case of artificial intelligence.
f)   Information exchange.
g)   Data analytics.

1.2 Background

Governments are compelled to respond to changes in the increasingly complex business environment, and revenue administrations, in both developed and developing countries, are often the first that have to respond. Consumption patterns, business offerings, sophistication of consumers, sources of income, modes of supply and communication channels continue to evolve, and long-established regulatory and compliance models may no longer be fit for purpose. This is particularly true of developing countries where the pace of change can often be greater as countries leapfrog stages of technological development – e.g. in mobile technologies. Modernization of domestic revenue mobilization (DRM) to respond to current trends is thus critically important.

Tax administrations around the world have undergone major system development efforts since the 1980's; these have intensified since the turn of the century. While computers were deployed for tax administration work in many developing countries, these were initially used largely for word processing and isolated data management. Developed countries often deployed custom developed software that required high investment Unix and mainframe systems. These delivered specific "point" solutions that performed a limited set of tasks, e.g. tax debt management or tax assessment; many also required large investments in dedicated ICT staff both to maintain systems and to manually input information and required task instructions. Such mainframe systems added centralisation and ICT implementation of specific processes and sub-processes to the standard business process (e.g.: a tax assessment, instead of being typed out and issued from a specific tax office would be issued from a centralised computer centre; however, the underlying process would still be the same, so that a tax official would fill in a paper form to be sent to the computer centre rather than give instructions to a typist).

Since the late 1990's, Integrated Tax Management Systems (ITMS) have incorporated a range of technological solutions and started to make use of evolving internet capacity. These enabled tax administrations to consolidate functionalities from multiple legacy systems into one. They also implemented e-filing; however, many achieved only a low electronic filing rate. A common issue at that time was that system processing slowdowns during peak filing periods caused increased taxpayer complaints.

Improved and lower cost technology choices in the following decades have allowed tax administrators accelerate their modernization efforts. The explosion of web-based services in the commercial world and improving infrastructure and connectivity have led to more receptive internal and external stakeholders. Taxpayers, including in developing countries, have become increasingly comfortable in engaging with digitized tax administration functions, while vendors of ITMS solutions learnt to better address client needs. Enhanced solutions have become possible as increased hardware capacity became more affordable.

At the present time, the increased availability of data and analysis tools makes it possible to implement data analytics to identify patterns, trends, associations, etc. to improve tax administration compliance and enforcement initiatives. This in turn allows tax authorities to focus resources on potential risky areas based upon solid data and make much more optimal use of their scarce resources. The recent pandemic also added further impetus towards automation and the need to understand how each sector was reporting and paying. It showed the value of real time e-invoicing and online cash registers in monitoring consumption tax reporting (i.e. VAT/GST), the need for good payroll reporting and withholding tax management, and payments/collection management. It also showed that direct contact with taxpayers was not always necessary, and such resource intensive effort was best used in addressing revenue at risk with problematic taxpayers and relationships with large businesses.

As the volume of trade and tradeable activities within and among nations has increased, the volume of data has grown. This has led to national and international collaboration and information-sharing among agencies through initiatives such as the Automatic Exchange of Information, and through implementing common reporting standards for transparency. ICT use in tax administration is increasingly being considered in areas such as Artificial Intelligence, Blockchain, Machine Learning, and Robotic Process Automation. Automation is also being used to focus audit resources on more current activities to address compliance issues in a timely manner, using real time information. Predictive analysis can also help solve

problems of disputes and potential non-compliance, using e.g. advisory visits to check if data fits the reality of business. Looking ahead, ICT will be a critical factor in taxation of the digital economy and in meeting exchange of information (EOI) needs, both domestic and international.

These trends also offer an important opportunity for developing countries. Many such countries have, often with the support of the World Bank, other regional development bodies and bilateral development partners, made substantial investments in digitalization. However, inefficient underlying processes, institutional challenges, procurement difficulties and a lack of policy focus has in some cases resulted in sub-optimal choices and outcomes. However, the latest innovations in the sector offer many developing countries an opportunity to leapfrog and offer the most up-to-date service solutions to taxpayers.

The Ministry of Revenue (MoR) in Ethiopia is planning a comprehensive upgrading initiative for its ICT systems and infrastructure for tax administration. A World Bank mission in November 2023 identified major challenges that should be addressed, and a regional conference was convened in April 2024 to identify key challenges and share good practices developed in African countries. This paper provides a summary of global good practices and trends in technology-based tax administration and captures the lessons learned from various country experiences in the Africa region as presented during the conference.

2. ICT as a tool in revenue administration

2.1 DRM improvement, tax policyand digitization of tax administration

Taxation is recognized as a key driver for state building and accountability, and tax reform as a possible contributor to broader gains in state capacity and quality of governance. In the current global context and post-pandemic crisis, domestic revenue mobilization (DRM) must be at the centre of development and economic growth strategies. This requires a strong analytical framework to help countries establish productive, efficient, and equitable tax systems at both national and subnational levels.

Successful DRM efforts can create much-needed fiscal space for the government and allow for more spending on policy priorities including, for example, infrastructure, health care, and education. More reliable sources of revenue help avoid volatility in public expenditure and procyclical fiscal policy. Information systems play a critical role in revenue mobilization, as they increase tax administration efficiency and reduce costs, as tax administrations improve their capacity to collect revenue with smarter use of the information collected.

Many low- and middle-income countries (LMICs) countries have adopted a DRM strategy as a conceptual framework to address key shortcomings in their resource mobilization systems. Such a strategy relies on three pillars: (i) enhancing the quality of tax systems — increasing tax collection but also minimizing economic distortions and reducing inequality; (ii) strengthening operational capacity of tax administrations, both administrative and policy; and (iii) fostering social acceptance and legitimacy of the tax system, while improving public accountability.

Tax policy aimed at DRM improvements cannot be effective without a modern and efficient tax administration; tax policy and tax administration work symbiotically. The actual working of tax law depends on how it is administered, especially in countries with weak and uncertain rule of law. Also, improvement

of tax administration often requires revised policies and procedural authority in tax laws. Efficient collection and administration of the value added tax (VAT) and income taxes need policy reforms, e.g. to minimize exemptions and zero-rating clauses and to simplify complex rate structures. Tax policy design needs to be implemented to achieve a fair and consistent application of tax laws. On the other hand, a modern and effective tax administration needs a coherent and consistent set of laws to achieve its goals.

In view of the radical changes that have taken place in the global economy, tax systems cannot be administered in the way they were in the 1980's. This stems mainly from substantial changes in the economy, globalization and financial integration, rapid development of new technologies, and new approaches to the role of taxation. Digitalization enables tax administrations the tools to address these challenges and is thus central to a national DRM strategy.

Digitalization is expected to improve the efficiency of tax collection, help reduce costs, enable a more efficient fight against corruption, help trace operations, and foster transparency. Digitalization allows tax and customs administrations to evolve into a new role and find a balance between facilitating tax compliance and maintaining effective control of taxpayers' obligations. Digitalization, especially data analytics and information management, is now the key strategic tool for DRM. Tax administration has become essentially a business of information management as well as application of tax laws. A clear strategic view is thus needed to understand the impact of information technology systems on DRM and to exploit data quality management to its full potential.

2.2 Objectives of digitization

Taxation is principally an information game. For formal businesses, information is held by business managers, financiers and bankers, buyers of outputs or suppliers of inputs, etc. in addition to the owners or shareholders. Informal business poses more of a challenge; information is held by the owner-manager only and many other sources of information do not apply to informal business activities. Good information management is central to tax administration and ICT is a key component in this task. The use of ICT is not a choice; it is a necessity. The key objective of digitization of tax administration is to leverage, in an optimal manner, information held by the tax administration (and Customs, where not integrated with the tax function), other government bodies (business registration bodies, property cadastres, etc.) and private sector bodies (banks, employers, etc.).

Taxpayer segmentation is a key feature of modern tax administration and is another key objective that enables efficient allocation of scarce resources to ensure compliance. Segmentation of large and medium-size taxpayers is applied by many African nations. However, more efficient segmentation is needed. Enhanced automation and better data will enable better segmentation and risk analysis. Tax authorities need to analyse and develop knowledge for each group of taxpayers to manage compliance risks — e.g. type of tax, size, type of activity (industry or sector), or type of risk. Since audit resources should be directed at cases exhibiting highest risk to revenue, it is essential to use the insights gained from automation to enhance market segmentation strategies and risk profiling approaches. This will inform the appropriateness of compliance control strategies, and in turn the appropriate allocation of resources.

A further objective for tax administrations in most African nations, is to ensure appropriate taxation of the informal sector. All countries face the problem of taxing micro, small, and medium enterprises (MSMEs), but the size and nature of the problem varies across countries. The level of informality is generally high in most sub-Saharan African countries, and is estimated to be 34 percent in Ethiopia, according to World Economics. ICT can play a large role in combating informality, through improvement information about value chains from the import/manufacture, wholesale and distribution levels down to the retail level where most informality takes place. Digitized payment systems, and good information gathering from service providers can be another key lever in bringing informal players into the taxation net. E.g. the Uganda Revenue Authority (URA) has rolled out the Electronic Fiscal Receipting and Invoicing Solution (EFRIS), to better regulate business transactions and manage issuance of receipts from a tried source.

As automation is improved, administrative strategies that focus on MSMEs can be viable with enhanced information. The use of third-party information through better data, combined with improved external audits and appropriate penalties, can incentivise formalization. The use of new forms of communication to improve taxpayer education and use of technology can also lower compliance costs, thus improving the incentives of becoming formal.

2.3 Challenges in tax administration automation

The most significant challenges in ICT implementation in tax administrations in developing countries stem from the types of solutions procured in the past. An ITMS often does not effectively control collection / enforcement / audit activities in the way desired and is, for example, only capable of generating TIN's and handling tax assessments. Another criticism of a COTS ITMS is that they are often not easily updated for tax law changes and thus calculations made can be prone to errors.

A second key challenge is poor data quality. Often, legacy data are not standardized or are compromised and cannot be used for decision making. Key factors in this are the migration of data from multiple legacy systems (e.g. for VAT vs CIT), the lack of, or use of, different data standards in holding data, multiple data sets for the same taxpayer, etc.

Finally, many public sector ICT projects have been found to have been seriously compromised or have suffered significant budget overruns, especially when trying to simultaneously enhance operational processes and ICT capacity. The main causes identified as contributing to these failures are:
* Projects start with grand visions and bold objectives that are unrealistic.
* The magnitude of effort needed is radically underestimated.
* ICT project management issues were not consistent with Tax Modernization initiatives.
* Over-ambitious conditions which cannot be managed and delivered against their original objective.

A broader challenge is that many organizations do not fully recognize that digitization of tax administration goes beyond technology and requires changes to legislation, business processes, and, sometimes, changes to tax policy to ensure success.

2.4 Reforms in institutional setup and strategic planning to optimize returns from digitization

Achieving improvements in DRM requires an approach that combines implementing international good practices aligned with enhancements in automation. E-governance initiatives aimed at automating business processes of tax administrations and customs should also be undertaken in close collaboration with other public sector institutions to improve delivery of services. Examples of this whole-of-government approach are the single-window initiative for Customs or support in developing and implementing strategies to combat the informal economy.

A strong emphasis on quality information that can be exploited efficiently by the tax administration is thus essential. However, to achieve this, it is essential that business processes in tax administration are well aligned with ICT enhancements. For example, the quality of data contained in electronic invoices should be analysed to ensure that this can effectively be used for tax audit purposes. For this, it is necessary to have in place the right business processes and organizational setup consistent with such business processes. Further, as cross-border trade in both goods and services increase, it is more important now to understand tax processes and technology standards of key trading partners, especially neighbouring states and fellow members of any regional economic cooperation arrangements. This is particularly true of technology used in Customs, both for trade facilitation and for cross border trade, e.g. in transit arrangements with neighbouring countries.

Technological change impacts organizational structure, business processes, and human resources (HR) policies. Beyond the mere adoption of new tools and technologies, digitalization of the tax administration involves comprehensive legal and institutional transformation. This process encompasses all the required adjustments to traditional operational models to achieve long-term and sustainable efficiencies, offer new and improved services to taxpayers, and develop new capabilities in key areas like digital invoicing, electronic tax payments, advanced data analytics, and value chains and factoring. This is especially true in a country (e.g. Ethiopia) as it seeks to implement e-invoicing. A consistent, integrated approach will allow tax administrations process the large volumes of information and increase the reliability, accuracy, and timeliness of the information processed, which together reduce administration costs.

A large scale ICT/digitization project can also be an opportunity to undertake a "cleanup" of foundational policy and legislation at the beginning of the reform process to maximize the impact of digitization. Since investments in IT modernization require a lot of time and resources, it is important to address the organizational and legal underpinning (see below) of the reforms. This will improve their durability while reducing the cost of future upgrades/changes to ICT frameworks.

2.5 Establishing the legal framework to implement digitization

An important issue in the DRM strategy is legal stability, which requires systemizing the principles regarding interpretation and application of various tax laws and codifying the principles that courts have developed throughout the application of tax norms. It is also necessary to promote administrative processes that offer legal stability to taxpayers; this includes the implementation of binding tax rulings and a clear and efficient procedure to request and obtain such rulings.

It is therefore essential to have codified tax procedures that encompass the powers granted to the tax administration agency to administer the tax system, taxpayers' rights and obligations, and the elements and key features of the core processes of tax administration. These include registration, taxpayer services, tax audit, tax disputes, tax rulings, collection enforcement of tax debts, as well as the penalties applicable

in case of noncompliance. These rules need to strike a balance between the powers granted to the tax administration and taxpayers' rights to promote a fair application of the tax system.

The codified tax procedures above need to also consider the use of ICT for tax administration. Traditionally, tax laws and policies did not account for this aspect, and thus required, e.g. a physical signature to complete a tax return. Optimal use of automation investments thus require that tax laws address the establishment of computer systems for tax purposes. Specific amendments may be necessary for tax laws and regulations to allow for, e.g. the use of electronic data as evidence, the use of digital signatures, production and retention of documentation, sending electronic communications of notices, letters, etc. and so forth. It would be appropriate to conduct a full review at the initial stages of a major automation project to identify gaps when the full specifications for such an initiative are completed. Further, tax administrations may also wish to conduct periodic reviews of the legal implications of their ICT implementations. The reason for this is that tax law is often dynamic and new rules and standards are often implemented into law to meet current needs. It is important to ensure that the administrative machinery continues to support implementation of such new rules.

The rules must also address alternatives to electronic communications when ICT systems are down, delayed or inoperative. Issues of data privacy, protection and storage must be addressed. A policy decision must also be made on whether taxpayers may retain data in cloud or international solutions or are required to maintain their primary data. Finally, "whole of government" data standards must be applied, with any necessary adjustments, to determine data standards for a tax administration.

It is thus necessary to conduct a comprehensive review of current legislation in line with the business requirements developed for the full range of ICT solutions envisaged. E.g. does the current legislation and regulations provide the opportunity for taxpayers to deliver their tax filings electronically? Is this true of all other supplementary documentation and requirements? And when an overall requirements document is prepared for the legal changes needed, it will be necessary develop ICT specifications that respond to those requirements.

2.6 Risks and challenges

2.6.1. General overview

A large scale digital transformation process carries a significant degree of risk. Tax Administration must learn to anticipate and manage these risks and challenges through an approach that accommodates continued and gradual evolution of tax administration ICT systems. While full-scale updating of systems may be necessary at specific times (as in the case of Ethiopia in 2024), it is worthwhile to incorporate this with an ICT strategy based on permanent small-scale improvements that constantly transform the functional practices without creating any disruptions.

2.6.2. Data challenges

As mentioned above, poor data quality is a central challenge. This is worth examining in some detail:
a)   Duplicated data – e.g. invoice data can come to the tax administration without any standardization in the format of invoice numbering. Without a unique number, there can be multiple invoices with

the same number or an incorrect format that would not allow the system to identify a match for cross-checks and controls. Over time, widespread use of e-invoicing can of course remove or reduce this problem, but it will persist for some time.

b) Inconsistent formats – when the same information is stored in different formats. For example, dates are a complex field to many systems, as there are many potential ways that these could be entered into the system. Other potential difficulties may arise from tax identification format, addresses and phone numbers and the absence of validation rules for data consistency.

c) Incomplete information – where date fields that are not completely filled in or are left blank altogether, which can be a challenge for analytics work. With such data problems, it may seem impossible for the risk analysis units to target something that will not show up in a query because the data were lodged as incomplete, vague, or inconsistent.

d) Multiple units and languages – this is the case for invoices, transport documents, or advanced cargo information. Differences in language script or units of measurement can create difficulties if the analytics tools do not recognize or know how to translate them. This can be a particularly a challenge in multilingual country like Ethiopia, which also uses a unique calendar; further, many countries use multiple languages and face challenges in determining which to use – sometimes leading to inefficient and expensive choices by trying to catering to all. The potential use of different scripts also poses a further challenge.

e) Inaccurate data – which can arise from taxpayers giving incorrect information to making a typo when entering data manually, or inputting details into the wrong field. These can often be among the hardest data quality issues to spot, especially if the formatting is still acceptable.

The absence of data quality may lead to the following challenges:
• Evidence-based decisions and policies would be only as good as the data they are based upon.
• Missing or duplicate data could result in poor audit case selection, bad auditing practices, altered or nonobjective reporting, and poor decision-making, leading to negative outcomes.
• Unreliable or contradictory data can make it difficult to verify irregularities among taxpayers, which can lead them to question the data accuracy, creating mistrust toward the administration.
• There could be missed opportunities or failures in service provision.
• Risk mitigation could be impacted by possible inconsistencies in the risk scoring system and unreliable information to identify risk trends or fraud schemes.
• Automated controls are non-existent due to the lack of format and structure in the data fields.
• Cross-checks cannot be properly implemented for effective compliance monitoring.
• There would be impact on integration processes and the interoperability between agencies.
• Administrations are unable to assess their own strategic or operational effectiveness.

2.6.3. Project management and leadership

Project management is a key risk. Automation projects are often left to the ICT Team, which does not necessarily understand the business objective. It is also often the case that business users are caught up in their own targets and deliverables and thus not fully aligned with the goals of the automation project. A related issue is the need for truly independent validation and verification (see 3.6 below) without which rigorous functionality, integration and user acceptance testing is not possible.

A further area of risk is project leadership. A project IT Lead is not necessarily the best project manager; it might be necessary to look at all elements of the project and build a team that balances business skills,

strategic leadership and ICT expertise. Where another government agency or government sponsored body (such as independent strategic ICT organization of the government) outside the control of the tax administration is taking on the development responsibility for the solutions planned, it is also important to establish protocols for management of those interdepartmental relationships and have a forum for resolution of disputes.

2.6.4   Measurement criteria

Another risk area is the lack of measurement criteria for the project, to enable a tax administration to evaluate the degree to which the development team may have gone off course. External service providers can often be unprepared for the challenges they face. These can arise from complex solutions that were inadequately specified, or over-confidence on the part of development partners in accepting the challenge presented by projects.

Such development firms can often demonstrate optimism bias to a degree that blinds them to the risks of the projects they agreed to undertake. This may include costs associated with interfaces required with other systems, which are often significantly underestimated. As a project hits disruptions and ad hoc decisions are made to solve them, these take the entire task off course; often, project teams have no reference back to an agreed set of outcomes. A good example for project risk management is from Zambia; the ZRA avoids programmes, projects and activities whose risks have not been assessed and mitigated through a formal Project Implementation Committee (PIC) that makes risk-based decisions in determining project direction (see Annex).

2.6.5   IT system development model

A final area of risk in the case of the planned solution implementation is the development model. For example, in Ethiopia, in view of the importance of IT in revenue collection, the Government saw the need to bring its technology inhouse. Hence, it issued a directive for the Information Network Security Administration (INSA) to develop and manage the IT system for tax administration. Following completion of the BPT, INSA is tasked with instituting a data warehouse, business intelligence, data entry infrastructure, and business analytics.

To explain further, Ethiopia's MoR is thus developing a unique level of software development skill sets in INSA for delivery of the solutions. This includes the professional development of technical personnel, and of project management skills, which are valuable in the open market. Given the ongoing retention challenges already faced by MoR and other government agencies in Ethiopia, retention of the right skills and ensuring their availability at the appropriate times will be critical. The risk from loss of mission critical personnel should be considered, and appropriate mitigation planned. The example of the Zambia Revenue Authority (ZRA) can be considered; ZRA has devised a policy for project staff to be compensated differently from other staff to guard against that risk and introduced other staff support, such as team-building exercises and staff welfare activities.

3   Essential elements for digitization

3.1 Updating of business processes

. As a step prior to digitalization, business process improvement and business model change are key to the efficient transition between current and new business models. A key goal in digitization should be to incorporate technological changes that will facilitate control of compliance and facilitation of taxpayers' obligations. To that end, it is critical that ICT development tracks and follows business processes that deliver efficient, modern tax administration.

Accordingly, the review of business processes incorporating current international good practices, including updating of any relevant processes, is critical before any major ICT updating exercise is undertaken. Such a Business Process Transformation (BPT) plan should be implemented first and coordinated with the tax administration solution implementation before attempting to update ICT systems. The BPT plan also included evaluating the adequacy of the resources currently dedicated to taxpayer outreach and education efforts. A gap analysis indicated areas for improvement to be addressed during the BPT implementation (i.e.: co-requisites to the modernization of the ICT solution).

Complex processes which the legacy system could not accommodate are unlikely to be workable in a new system. It may thus be more efficient to change the underlying policy/procedure of such complex processes; often, assuming policies cannot be changed can be a convenient reason to not address the issue. It is critical that the end-to-end process be as lean and as simple as possible. Tax administrations should simplify processes as much as possible and continuously refine those processes as new technologies allow the organization to change the way it delivers its services.

It is also important to properly determine the scope of tax administration functions to be covered by the digital transformation process, which goes beyond the traditional assessment methods, filing duties, and audit inspections. Key functions must also include registration, document management, legal obligations, taxpayer assistance mechanisms, communication channels, notification practices, taxpayer portals, appeals procedures, and any other technical functions like risk management. The completed BPT Plan should be reviewed in this light, with key processes and sub processes identified and detailed process maps completed, before automating the processes.

An initial organization structural review may also be needed as part of implementation of the Business Transformation Plan. This would assess the current organizational structure from the perspective status of current IT strategies and implementations, such as the tax administration solution plans and associated architecture, licensing, risks, needs and other IT requirements. The results of the review should be brought back into a Tax Technology Plan that outlines the tax administration information infrastructure and the technical and training strategies necessary to bring current systems to intended levels of usability. The updated Plan will provide a unified approach to ICT management and investment.

Another task in examining business processes should be expanding utilization of new management reports (including establish relevant Key Performance Indicators, or KPIs). Optimally, statistical analyses and management reports a) indicate how well the organization is performing against its overarching organizational strategies and objectives; and b) target the right audience, at the right time, and at the appropriate level of detail to inform effective decision-making. There is also a need to develop ICT and HR assessment tools to help to understand and assess the human and institutional capacity gaps of the tax administration.

To support the proposed organizational and process changes, tax administrations should develop and implement training and support for internal users, system administrators, other IT staff, as well as external and management-level users. Career planning and skills requirements of the IT support staff should also be investigated, and where applicable, additional training incorporated in study tours with an emphasis on retention of trained IT support staff.

3.2 Requirement development in line with business process analysis

3.2.1   Tax Technology Plan to document requirements

Well-designed information systems increase the effectiveness of the internal operation of the tax administration and can reduce costs. Through information systems, integrated taxpayer registries are created to collect the basic information needed to manage taxpayers. Process-intensive functions such as form and payment processing as well as taxpayer accounting are also automated. Selective monitoring and selective enforcing of compliance to reduce costs of compliance and administration can be implemented with information systems, therefore channelling resources directly to compliance activities and taxpayer services. By automating manual functions, tax administrations can move to a compliance risk management model that systematically identifies, assesses, ranks, and treats tax compliance risks in order to effectively deploy its limited resources.

It is essential, however, that detailed requirements are developed that accurately conform to the BPT Plan and is supplemented with process maps that document all important business processes of the tax administration. The Tax Technology Plan must thus encompass these requirements and must address:
* Business Component. The tax administration business model, process maps and supporting databases, transactional systems, process control systems, planning systems, and decision support systems, especially in support of and enabling the new processes defined by the other teams.
* Technology Component to identify candidate technologies, including a User Component (workstations, printers, office productivity suites, client operating systems needs and standards) and Server Component (servers, server operating systems, maintenance, storage, archiving, backup, and recovery needs, policies and deployment).
* Network Component. Local area networks, wide area networks, bandwidth leasing, and telecommunication between different offices as well as other agencies.
* Management Component. Management of IT within the tax administration, interfaces with other agencies, developers, system administrators, business partners, training, and physical facilities.

The Technology Plan should be updated periodically as new requirements are identified and technology changes.   Further, new initiatives at the tax administration will require additional modifications, enhancements, or other changes or improvements to the Plan. E.g., incorporation of more risk-based workload selection methodologies, increasing capabilities for the receipt and processing of electronically filed returns, generation of automated performance management reports providing indications of workload volume quality and efficiency, and other recommendations, may require enhancements to automated systems.

Requirements development should finally include criteria for post-implementation assessments regarding the effectiveness of the ICT modernisation. These requirements will ultimately inform the criteria for

functionality and user acceptance testing. They will also inform the Business Systems Readiness Assessment (SRA).

Retention of skilled staff can be a constraint in implementing a Technology Plan, as critical institutional knowledge and specialist skills can be lost at key stages of implementing the plan, slowing down progress of the overall project.

3.2.2 Requirements for data standards and compliance needs

Data quality is crucial in optimizing the availability and value of the data required to meet the tax administration's objectives. Processes and protocols should be in place to ensure an acceptable level of confidence in the data, based on two aspects—the relevance of data for their intended use and their reliability. Validation rules are regulations established by the administration, through a system, which oblige the taxpayer to enter information in the indicated and consistent form when filing an invoice, a tax return, or a customs entry, among others. The type of validation can be implemented based on format and compliance, including form and syntax, validations of guidelines that establish specific formalities in the procedures and complementary validations, when there are specific requirements that come from certain scenarios or entry fillings. Rules regarding compliance with the requirements of the tax code should also be built into the validation criteria. It is essential that only data that meet the defined criteria and possess the required attributes are migrated into the new system.

It is necessary to conduct an analysis to examine the current taxpayer base in order to develop compliance profiles for major taxpayer segments. Taxpayer segmentation analysis will enable MoR to better understand its "customer" base and tailor outreach and compliance strategies to meet the unique needs of each. This will enable (i) a deeper understanding of delinquency and non-compliance issues specific to each taxpayer segment, and the design of effective enforcement programs, and (ii) targeted and customized assistance which will improve voluntary compliance. Operational efficiencies may be achieved by specializing staff by customer segment.

In addition to the compliance profiles analysis, a separate analysis of needs for developing risk-based examination, or audit methodologies (such as those developed but not yet implemented), and risk-based collection should be conducted to inform requirements for risk-based tax administration. These will identify customized approaches and requirements for populations that file inaccurately, file and owe a balance, and non-filers where the system finds a probable tax liability.

The experience in a number of African countries, as identified during the conference (see Annex), was that the most important step in automation is to have a plan to improve and clean up data. Subsequent steps after that stage is to then use data to improve compliance, and to have in place a methodology to assess the effectiveness of initiatives. Such a methodology could also include, e.g. peer reviews on a confidential basis, working with other comparable tax administrations in the region. Development partners such as the World Bank or regional bodies such as ATAF can can also have a role to play in such reviews.

3.3 Internal and external communication needs

Tax reform efforts often focus on legislative changes and management initiatives; they can overlook the need to effectively engage taxpayers and internal stakeholders. It is thus important to identify future communication needs and develop outreach programs to meet these needs. This is especially the case,

e.g. in Ethiopia, where the planned ICT developments will be far-reaching and will change the way taxpayers comply. Work in this area must focus on both providing taxpayers with the information they need today as well as building the organizational capacity to identify and deliver educational and training programs to meet the future needs in a changing compliance paradigm. Many downstream filing and compliance issues can be averted through informing taxpayers of how to comply with their obligations.

Increased attention must be paid to issues related to mass communication — publishing of the form filings, data formats, and structures for electronic filings — and to the handling of information and privacy intrusion, which affect all taxpayers. For instance, collection of massive amounts of information combined with data mining techniques allow tax administrators to find data that are even unknown to a taxpayer and to use this information to profile the taxpayer. Some Organisation for Economic Co-operation and Development (OECD) tax administrations have identified three emerging risks regarding the access and use of information that may create increasing difficulties for tax administrations over time: (a) changing work patterns, (b) changing business models, and (c) digital transparency issues. These risks are already present to some extent and may be expected to grow over the coming years with the increasing digitalization of the economy.

Work in this area must review strategies, norms, organizational arrangements, processes and information systems used by the tax administration to communicate its policies, achievements and operational information to external stakeholders. Work must also include strategies through which the tax administration could collaborate with business, accounting, legal and bookkeeping firms to clarify any areas of digitized compliance that are confusing or ambiguous.

Direct communication with taxpayers, both for service provision and for information gathering is also important. The experience of Kenya in particular is very relevant; KRA's mobile phone application, the KRA M-Service platform, which enables taxpayers to access information from KRA by text message and allows mobile payment of all taxes and e-slip generation for traffic revenue fees. In Malawi, e-filing and e-payment stand at 70 percent and 100 percent; the MRA has introduced Chatbots & Virtual Assistants i.e. "Yankho" on Website and "MyTax" on Telegram.

Work should also cover design and implementation of a comprehensive service programme which allows taxpayers to receive support in utilising the new digitized tax compliance systems. This should examine the most cost beneficial and effective avenues including general media; consultations at local offices; and specific contact by telephone, e-mail or other correspondence. Tax administration internal communications on digitization should also be strengthened to improve management, coordination, information sharing, mutual trust, morale and implementation of the modernization initiatives.

3.4 Maturity models for modern tax administrations

Tax administration digitization is a journey; as mentioned above, evolving business models, economic growth and technology developments require continuous adaptation. Accordingly, measures proposed for modernisation ought to address the observed challenges that correspond to the current maturity level with the objective of moving the tax administration to a higher level of maturity. It is thus helpful to utilise a maturity model for tax administrations to benchmark development and progress towards objectives. This helps the administration understand where it sits in terms of maturity; if it is at the basic level of

maturity and is barely delivering e-services and/or its data quality is poor, reform measures should not include introducing advanced AI solutions. Instead, it ought to focus on data management and rolling out basic taxpayer services.

To that end, a maturity model developed by the World Bank is provided as a reference tool. The main functional features and level-specific practices that characterize the different maturity levels of a tax administration can be classified as follows:

Maturity level 1: Initial	*Maturity level 2: Basic (Practices for Controlled Operations)*
- There is a lack of adequate legal framework—legal/regulatory institutions, modern tax policy, civil service rules and regulations for attracting and retaining qualified staff, international accounting and professional standards, and modern financial and banking standards and institutions. - There is an absence of policies and procedures in place to guide staff. - There is a lack of tax administration control regarding the taxpayer population. - There are no provisions in the tax laws for self-assessments. - There is an ineffective and inefficient taxpayer registry. - There is a lack of a well-functioning taxpayer account. - There are no compliance strategies in place. - There is a potential for corruption. - Voluntary compliance is not a concept practiced by the revenue administration. - Informal economy is widespread and impacts tax administration functioning. - Taxpayer services are largely non-existent. - Relations between tax administration and taxpayers are confrontational. - There is no segmentation of taxpayers to tailor processes and strategies to its distinctive features. - There are no lines of communication with public and private sector institutions. - Technology is not available or is available on a limited scale. Hence, work is mostly conducted manually.	- A formal process to register taxpayers exists but usually with unreliable Taxpayer Identification Numbers. - Taxpayer accounts are largely unreliable. - Segmentation of taxpayers has begun, but well-defined criteria for inclusion in different segments are non-existent. - Progress is made in the incorporation of provision in the law for self-assessment and in the development of the concept of voluntary compliance and its inclusion in tax administration strategies. - Development of an anticorruption strategy limits opportunities for corruption. - Taxpayer service program exists but is poorly organized and understaffed. - Ill-conceived compliance strategies do not focus on high-risk segments. - Long-term strategic plans for the overall tax administration do not exist. - Annual operational plans of the departments are independent of each other and not coordinated. - Some technology is available but is usually outdated; most of the work is still done manually. - Procedure manuals are minimal, and institutionalization of procedures varies across departments. - Skills of the staff vary across departments. - Some contacts with public and private sector groups have started, but there is lack of coherence and sustainability. - There is a substantial lack of legal framework.
Maturity level 3: Intermediate (Practices for Efficient Operations)	*Maturity level 4: Advanced (Practices for Sustainable and Optimized Operations)*

• Provisions in the law enable self-assessment. • Limited opportunities for corruption. • Voluntary compliance by a high percentage of taxpayers—more than 75 percent. • Registration of taxpayers has been completed, supported by a good system of Taxpayer Identification Numbers. • Taxpayer accounts are usually accurate. • A segmentation process backed by good criteria exists to facilitate identifying different segments. • Compliance strategies focus on high-risk taxpayers. • Strategic plans for the tax administration exist, and these plans coordinate annual operational plans of core functions. There is still a greater focus on short- and medium-term objectives and a lack of focus on long-term direction. • Policy and procedure manuals are available for all the core functions, but they are not updated. • Good relationships with public and private sector groups with some exceptions. • Modern technology and equipment are available, but there is often a shortage in specific departments. • The tax administration has begun embracing many technological advances used in the private sector. • Legal and regulatory institutions, modern tax policy, and civil service rules to support operations exist.	• A strong presence of legal and regulatory institutions, modern tax policy, and civil services rules exists. • Provisions in the tax law for self-assessment have been implemented for several years. • Concise online policy and procedure manuals are available for all tax administration functions. • Registration of taxpayers is accurate, and the taxpayer registry consisting mostly of active taxpayers. • Voluntary compliance by more than 90 percent of taxpayers. • Taxpayer accounts are rarely inaccurate. • Cases of corruption are rare. • Segmentation of taxpayers is a dynamic process with well-defined criteria. • Compliance programs tailored to different risks posed by segment of taxpayers are in place. • Extensive use of third-party information to broaden the coverage and effectiveness of compliance programs. • Strategic plans are focused on long-term objectives that guide the development and implementation of annual work plans. • Relationships with public and private sector groups are very positive. • The tax administration has reliable information systems supported by the latest technology. • The tax administration has already embraced and implemented many technological advances used in the private sector

Source: Junquera-Varela, R.F., & Lucas-Mas, C.O. (2024)

Based on the above matrix, the tax administration (or its advisors) can develop a current state assessment of its present state in terms of administration maturity. Based on this and the corresponding functions in the BPT Plan, recommendations can be developed for actions across policy, legislation, business processes, and technology for countries to move to the next maturity level(s). In doing so, the reform agenda should consider the broader infrastructure and economic development of the countries to develop appropriate strategies for the digitization of tax administration.

3.5 Interoperability with key external stakeholders

This paper makes the point that good data is central to modern tax administration. The most important gain from the significant investments in ICT is the ability to gather, understand, manage and use data. However, the tax administration may not have all relevant data. While tax agencies are data rich, third

parties will have additional data which can supplement tax data. Combining tax data with other data will provide a very robust picture of the taxpayers' activities.

Data can be held by other government bodies – local governments, property cadastres, vehicle registry for car ownership, licensing bodies that provide permits to conduct specific business activities, with some of which the tax administration may already have MoUs. Private sector organisations will also hold critical data; most importantly, banks and investment management firms will have wealth data; large businesses, especially in the sectors like consumer goods, will hold information on their distribution and wholesale networks, as well as of vendors. Sharing of data should be the norm; information linkage will enable faster and more efficient exchange of third party information. This will enhance compliance, expand the tax base and maximize the power of automation.

Building in interoperability requirements is therefore an essential part of digitization efforts in tax administration. In order to achieve this, a data quality programme is essential (see above, 3.2.2) and management must emphasize that quality data is a crucial business asset. There needs to be explicit recognition of the impact of poor data quality and application of appropriate process management. There should also be continuous data quality audits, a regular programme of cleanup and restructuring of data schemas as well as standards and software tools for maintaining data quality. Test cases can be developed between seemingly unconnected data, e.g. identifying entities with shared demographics information – email, telephone, address, businesses associated with problematic businesses, etc. Other typical areas to focus on are improper registrations, related entities with similar compliance issues – refund fraud, unreported income, fake invoices, etc. Attention should also be paid to how these data can enhance the audit case selection process and identifying successor businesses.

4. The way forward

4.1 Overview

The core outcome of the discussions during the conference are presented above. A follow up exercise is planned to understand whether systems were actually implemented as intended, and to undertake:
- A more structured approach to gather country examples, and to build up a repository of examples
- Address some questions about specific country examples, e.g. how high levels of online filing were achieved in countries with lower than average internet access (e.g. a trusted third party filing program, reliance on physical service centres of the tax authority that helped taxpayers key in their data?)
- Undertake a series of deep dive into country examples, e.g. through virtual meetings.

Some assessment metrics can be developed, measuring development over equal periods before the automation effort and afterwards, such as:
- Changes in sector performance.
- Number of request for deferral of tax payments.
- Request granted for suspension or extension of debt repayment plans.
- Number and nature of insolvencies.
- Use of different services, e.g. number of people contacting by channel, difficulties faced, wait time, web outages.

- Critical IT systems – capacity constraints, outage times, maintenance issues, internet availability, skills shortages, etc.
- Number of staff by function who are able to work remotely, who are able to come into the office when necessary,
- Number of staff who could be redeployed from non-critical to critical functions.

The experiences shared by the Rwanda Revenue Authority (RRA) in VAT automation is worth noting in this regard, where RRA developed a bespoke inhouse system including a back office to receive and check data, and a communication protocol with taxpayer devices. RRA issued the requirements and technical specifications for EBMs to the taxpayers and created a Certified Invoicing System that catered to various taxpayer systems and ensured interoperability of the data (see Annex for further details).

4.2 Need for independent verification and validation (IV&V)

Independent Verification and Validation (IV&V) means that a completely independent entity evaluates the work products generated by the team that is designing and/or executing a given project. The IV&V provider will monitor and evaluate every aspect of the project itself from inception to completion. That is a best-case scenario since it is far easier and more cost effective to correct problems that are identified early than later in the project. Still, it is better to identify a serious issue at the end of a project than after a project has had a production rollout, so IV&V makes sense as a final review.

One of the major advantages of an independent evaluation is that the person or group performing the evaluation will be unbiased. There are no emotional ties to the project, hidden agenda or ulterior motive. The company that performs the IV&V process is placing their reputation on their findings; professional reputations are hard to build and easy to lose. Another benefit is that in complex projects, especially large complex projects, it commonly becomes difficult for the project manager to "see the forest for the trees". Being intimately involved on a day-to-day basis with the details of a project can distort the view any project manager has of the functional status and progress of the project. Even objective evaluation of deliverables becomes difficult to achieve. Projects may fall into difficulty before the project manager has a chance to become aware of the problem and find a way to mitigate it. An independent, detached consultant will often be able to identify issues that have escaped competent developers and project managers.

In these circumstances, the tax administration should consider hiring an independent IV&V service provider that can deliver business knowledge, technical prowess and analytical skills. In addition to those core competencies, the tax administration should ensure alignment in both written and verbal communications. The ability to effectively communicate is an important attribute; the IV&V firm must have the ability not only to analyse, but to distil and communicate the results of that analysis in a form that will help direct the project.

An essential concept in effectively utilizing the services of an independent evaluator is to clearly state the expectations. Some implementing agencies want the IV&V service provider to guide the Project Manager to success by identifying problems on an ongoing basis. Others seek to independently evaluate a project's concepts and related business requirements up-front, and then periodically review the progress and deliverables. Finally, some agencies may just want a periodic "sanity check" to ensure the project is on track. It also possible to define a role which is somewhere between these levels of involvement.

4.3 Advancing ICT capability: use of data science and machine learning technologies

To remain relevant and effective, tax administrators must continually invest in scanning the external environment for emerging innovations in technology. They must also be aware of new developments such as cryptocurrencies and digital currency, and new ways of managing tax evasion risks. Data science and machine learning can significantly improve their efficiency; these are analytical tools, optimizations, and enhancements that are typically implemented on top of existing basic IT systems. Data science is typically used in tax administration to make sense of the vast amounts of available data, so that the organization can become smarter, faster, and more efficient. Of particular interest to revenue administrations is machine learning, a subset of data sciences that can be used to solve difficult problems that arise from the inability to process massive amounts of data efficiently. Although there is no agreed definition, data science is generally accepted as an interdisciplinary field that uses scientific methods, processes, algorithms, and systems to extract knowledge and insights from structured and unstructured data.

Data science includes techniques from a diverse spectrum, including statistics, Big Data, data management, data visualization, data mining, and machine learning. Revenue administrations have been using a subset of data sciences for many years to generate valuable insights from the available data and to make better-informed decisions. A variety of tools and mechanisms such as machine learning, Big Data, or exploration of the potential of blockchain are used by tax administrations in leading countries. Big Data has proved to be highly effective, for example, in controlling VAT compliance or avoiding fraud schemes coming from fake VAT refunds. In customs, risk analysis tools for trade operators are being implemented to improve control at the border and customs valuation.

Machine learning encompasses applications such as identifying fraudulent operations, automatically answering questions posed by taxpayers, identifying illegal goods in x-rays, predicting the cost of interventions, identifying the code of a given article in the harmonized system, and identifying potential errors or inconsistencies in declarations or tax returns. Hence, data sciences and machine learning can significantly improve the efficiency of a revenue administration. Tax administrations can seek to accelerate the move to a digital revenue administration and to use the new wave of disruptive technologies to radically transform how taxes are administered.

However, while the greatest difficulty about machine learning models is to implement them, an initial problem in many developing countries is to have a good dataset to be used in training. For instance, to train a computer to recognize fraudulent requests such as tax returns or import declarations, a series of examples that are not fraudulent could be fed to the computer, and the computer will build a mathematical model of what "normality" looks like. This will enable computing a probability that a new request is fraudulent, based on how much it deviates from the training data. If the training data are reliable, the machine learning system will perform well. However, if the training data are of low quality and many examples are misclassified, the computer will develop a skewed model of "normality" in the tax declarations or returns, resulting in a high number of false negatives. This will result in mis-deployment of audit resources.

It is thus necessary to focus first on the initial data cleanup work since these provide the basic data that are needed. For example, an audit module would be required before attempting to predict the total cost of an audit using machine learning. Typical modules that should be fully implemented by MoR before

attempting machine learning projects include registration, returns processing, arrears management, payment processing, audit management and tracking, taxpayer assistance, and legal affairs tracking and management.

While there is a lot of discussion on the benefits of Big Data and data analytics, artificial intelligence and machine learning, natural language process, cloud computing, and distributed ledger technology represented by blockchain, these should not be a priority for tax administrations in most developing countries, except for the very advanced. Rather, other technologies should be given priority in the IT toolkit to be considered, such as data visualization, statistical analysis, data mining, mobile collaboration and e-learning and predictive analytics. Tax administrations should ensure that the required underlying structural ICT systems are in place and are fully functional before looking to applying artificial intelligence or blockchain.

As can be seen from the comparative experience (see Annex), agencies like the URA have tried to address issues of data integrity and security, before moving to interoperability, and after that, towards machine learning and advanced applications. Similarly, the RRA has started looking into solutions such as pre-population of tax returns after completing implementation of the ITMS and online filing. The comparative experience in neighbouring countries in Africa also shows the value of having a detailed strategic plan, phased implementation of digitalization, and implementation of e-invoicing as a quick win.

Based on experience, key success factors for digital transformation therefore include:
- establishing the transformational strategy and vision;
- implementing the updated BPT Plan and addressing business process improvement;
- addressing fragmentation, structure, legacy issues, and quality of systems and data;
- achieving the ideal organizational structure;
- ensuring that tax legislation recognises and appropriately caters to digitalisation;
- ensuring that the digital transformation is driven by a Tax Technology Plan, a roadmap, and a clear action plan;
- recognizing the importance of the human factor
- promoting user adoption and trust through an inclusive change management program;
- communicating the benefits of digitalisation; and
- integrate an evolutionary perspective into ICT practices in the longer term.

The key recommendations emerging on positioning tax administrations for success in both acquisition and implementation of modernisation of ICT systems are:
- Document the deliverables for each of the targeted solutions in simple, clear and specific terms.
- Limit the scope as much as possible, with staged deliverables in an achievable timetable.
- Invest appropriate resources to establish data standards and ensure data quality.
- Document business processes clearly and prepare process maps before starting development.
- Focus on the core business processes and avoid more complex challenges such as Big Data.
- In the special circumstances of another government department taking responsibility for developing the solutions, prepare risk mitigation plans, especially for the near term, quick win solutions.
- Ensure interoperability of systems and data standardization and verification.
- Ensure that tax administration ICT strategy aligns with the broader government ICT strategic plan as part of a whole-of-government approach.

Annex: Case Studies

These are based on experiences shared by tax administrations on the various topical areas of their automation processes.

A. Ethiopia: Business Process Transformation

Ethiopia has moved to automate its tax administration processes although its systems are not yet integrated. In 2004, MoR piloted the Standard integrated Government Tax Administration System (SIGTAS) – an integrated database for managing taxpayers' records. Originally adopted to administer VAT, in 2006, SIGTAS was extended to cover other tax types and across all branch office. SIGTAS has operated with only limited functionalities as many enhancements, including new modules, were not incorporated.

Recent measures
In 2008, MoR launched the electronic sales registration machines (ESRMs), which had the capability to record sales and send data on business transactions to the tax administration through the cellular network. In 2010, it introduced e-filing and, in 2019, the e-payment systems.

In 2019, MoR launched the Business Process Transformation (BPT) project to redesign the core (and related non-core) processes of the domestic tax and customs administrations, as part of the Tax Transformation Programme. The BPT, which comprises IT and human capital transformation, went beyond MoR Federal domestic tax administration to include Customs and regional administrations. It sought to improve operational efficiency, taxpayer satisfaction and voluntary compliance, internal and external integration, risk management, and revenue collection predictability.

In 2020, the Government approved the 2020-2025 MoR IT Strategy for the new integrated tax administration system (ITAS) to replace SIGTAS. The BPT will introduce ITAS, data centre, data warehouse and business intelligence, and e-invoicing. As ITAS is being developed, the functionalities of SIGTAS (i.e., e-filing, e-payment, e-clearance, and national ID-based TIN registration[1], etc.) will be enhanced.

Implementation of the BPT necessitated amendments to the Tax Administration Proclamation, regulation, and directives. For instance, a Proclamation on e-invoicing was issued though not yet to be implemented.

The electronic single window service was also introduced. Subsequently, MoR has signed a number of memoranda of understanding with public agencies and financial institutions, which are required to share information with MoR.

Challenges
The initial automation of MoR processes used the existing manual processes for the business rules in the SIGTAS solution; hence, most MoR processes remain manual, which weighs heavily on the cost of tax administration and compliance.

Although the latest initiatives of data sharing and acquisition have increased the amount of useful data, the lack of interoperability among the systems – the MoR systems do not interface with those of

---

[1] The Government introduced the national Digital ID program in 2020; MoR expects to integrate with its system to facilitate taxpayer identification and monitoring.

stakeholders – renders data matching and validation difficult and, therefore, the data are not utilized fully for enforcement and compliance.

B. Uganda: Digitalization of tax administration

Overview

The Uganda Revenue Authority (URA) , among the pioneer revenue authorities in the region, has undergone a series of automation of its business processes since its creation in 1991. It has embarked on new changes in the recent years, such as the introduction of autofill of tax returns and simplified assessments.

URA's digitalization agenda has focused on (i) registration (smart portal, mobile apps and system integration); (ii) assessment (e-filing, online payment and e-accounting); (iii) audit (e-audit, data matching and case management); (iv) enforcement (predictive modelling, automated enforcement and cross-border collection), and (v) objections (appeals workflow, single taxpayer file and multi-channel communication).

In 2020, URA rolled out the Electronic Fiscal Receipting and Invoicing Solution (EFRIS), an initiative under the Domestic Revenue Mobilization Program aimed at addressing tax administration challenges relating to business transactions and issuance of receipts. It is a smart business solution used to record business transactions and share the information with URA in real time (concurrently). Once a transaction is initiated using any of the EFRIS' components, transaction details are automatically transmitted to URA in real time (concurrently) to generate e-receipts and e-invoices. The uptake of EFRIS was initially subpar.

In 2023, URA launched a three-year digital strategy aimed at integrating technology in tax administration. The strategy seeks to facilitate URA 's agenda of automating tax processes, enhancing quality assurance and mitigating revenue leakages. It has been dubbed as "a pathway to enhancing its digital assets to create an always-on reliable, stable, secure and interoperable digital operating environment between URA and its stakeholders, geared at improving efficiency, effectiveness and service delivery".

A number of digital solutions have been rolled out. These include the electronic receipting and invoicing system for e-filing and e-invoicing, digital tax stamping for excisable goods, customer relationship management system that integrates all emails from its "customers", rental tax income management solutions, a call centre with multiple touchpoints and taxpayer interface enhancements such as the web portal, the Mobile App, and the new USSD menu for payment of taxes. It has also introduced auto-populated web forms that can verify and correct if needed.

In 2023, URA introduced auto-filling of tax returns. Although this currently covers only VAT, plans to include CIT have been completed.

Web-based (pre-filled) tax return filing has replaced the excel format and has several benefits:
   a) Data is pre-filled from EFRIS and populated into the return on a daily basis.
   b) Data validation thus promoting data integrity
   c) Sections are clearly labeled to enable quick navigation.
   d) No data schedules (as they are already embedded in the system)
   e) Online payment of the assessed tax is enabled during return filing
   f) Linked to the ledger for offset validation

The auto-filling feature improves taxpayer experience and increases compliance. It has a user-friendly interface, reduces complexity of filing (hence fewer computational errors), processes filings in a timely manner, reduces time and compliance costs, and improves communication between URA and taxpayers.

With auto-filling comes simplified assessment, which sets deadlines for submitting returns and thus improving filing ratios. If a taxpayer does not file within the statutory or specified period, auto- submission kicks in and the pre-filled form becomes an assessment. However, implementation of auto-submission awaits URA administrative consultation on the period of grace.

URA built a new data centre and upgrades its legacy system regularly. Further, it has established service level agreements to monitor the speed and quality of service delivery. URA follows strict data governance standards and policies which are overseen by a cross-functional committee.

Measures to address challenges
1) Data security: The authority adopted a defence-in-depth strategy that covers human, physical and system dimensions:
    a) Educates and encourages staff to follow best practices such as securing usernames and passwords and respecting their roles and permission.
    b) Restricts access to the data centre and USB ports to prevent unauthorized entry or data leakage.
    c) Fortifies its system, from databases to applications, with firewalls and security layers.
    d) Trains IT security teams on the latest threats and counter measures.
    e) Monitors and improves its processes and technologies to safeguard its data assets.
2) Data confidentiality: To ensure that the data are accessible by only authorized parties, URA has built systems that define roles of access, approval levels, and data classification. Also, training is provided on data protection.
3) Data integrity: To protect originality of data and to avoid unauthorized alteration without proper verification, a system is in place for checks and approvals for any critical data points, such as ledgers or assessments.
4) Availability of service: To avoid any downtime that could disrupt operations and or compromise system security, the authority has built redundancies, firewalls and segments.

Some developments, especially EFRIS, have met resistance from the non-compliant sections of the business sector. However, URA has intensified stakeholder and enlisted the political support engagement.

Future steps
Some of the initiatives include:
1) Offer multiple languages on the web portal.
2) Improve interoperability of systems by creating integration layers to standardize and facilitate data flow between URA systems and those of its partners.
3) Employ AI in tasks such as analysing customer sentiments from every touchpoint.
4) Explore the use of machine learning to classify and process requests from the Relationship Management Tool.
5) Use blockchain technology in interacting with URA stakeholders.

C. Nigeria: Deploying digital technology, The case of TaxPro Max

Overview
Initially, Federal Inland Revenue Service (FIRS) procured an off-the-shelf (OTS) IT solution but, for long, the solution failed to meet FIRS' automation needs. The limitations and cost of customizing the OTS solution, coupled with some institutional constraints, proved a challenge.

The issues included manual registration and filing; duplication of tax identification numbers; arbitrary payments that resulted in underpayments, overpayments, and payments into wrong tax accounts; difficulty in tying payments to assessments and verification; absence of an electronic register of utilized withholding tax; difficulty of obtaining and validating tax clearance certificates; and excessive customization requirements for the existing OTS solution (i.e. build instead of buy).

Management decided to look inwards for a possible solution. As an initiative, some staff of the Planning, Research and Statistics Department of FIRS started developing a software solution, named TaxPro Max, which sought to address the inadequacies of the existing system, lengthy procurement cycle for change requests, and persistent change requests from stakeholders, among others.

TaxPro Max Roadmap
2020: Documentation – The team carried out documentation to understand where the service was and problems to solve.
2024: Operationalization – In steady increments, the team adopted agile methodology; kept improving on the system while running it.
Optimization – To take advantage of advances in technology like machine learning to strengthen what works well and course-correct what hasn't worked well.
2025: Continuous Improvement – To keep an eye on global good practices, improve collaboration, outsource where necessary, etc.

Benefits realized
TaxPro Max has enabled
(i) introduction of the desired features i.e. self-service registration with automatic TIN generation, compliance with the international standard industrial classification, 100 percent online filing of returns with payment tied to assessments, unified processes across tax offices to a large extent, duly authorized withholding tax credits, automation of taxpayer ledger,
(ii) (adoption of agile project management methodology to address stakeholder's changing needs,
(iii) and faster time-to-market as internal resources were not bound by public procurement requirements, and
(iv) (increase in tax collections.

Challenges
Despite the progress, TaxPro Max faces:
i. Absence of a previously successful modernization program governance structure;
ii. Resource and skills limitations, as FIRS' primary mandate is tax collection not software development);
iii. Key man and tunnel vision risks, due to reliance on a few key staff and singularly focusing on the solution;

iv.   Immunity – internal resources not being held to the same standards as a service provider;
v.   Low discipline in scope management;
vi.   Ownership of intellectual property;
vii.   Stakeholder management; and
viii.   Inadequate documentation.

Lessons learned:
1. A hybrid system (build and buy) may be ideal in some situations. Given time and resource constraints, FIRS is considering this option.
2. Everything works better with the right governance structure in place i.e. a need for adequate program/project governance.
3. Certain resource risks need to be transferred, i.e. outsourced, hence a hybrid approach.
4. Change management is never too much – engagement with internal and external stakeholders is necessary; management should buy in.
5. Documentation is paramount.
6. IT should align with the business owners.
7. The project should have adequate funding.

D. Zambia: Practical aspects of deploying digital technology, The case of Taxonline

Overview
Zambia Revenue Authority (ZRA or Authority) started automation in 1995. Over the years, it deployed a number of solutions such as e-systems, Integrated Tax Administration System (ITAS), Tax Administration Refund Processes Systems (TARPS, developed in-house), and TaxOnline 1 (procured). ZRA has registered success in inhouse systems development and customization, namely TaxOnline, TaxOnPhone, TaxOnApp, ASYCUDAWorld, Mineral. Output Statistical Evaluation System (MOSES), Customs Single Window, External Interfaces, Smart Invoice, and Integrated Payment System. In 2019, ZRA focused on innovation of a local solution, which led to the inhouse development of TaxOnline 2 in 2023.

ZRA opted for inhouse development because
(i)   its unique business needs called for custom functionality, integration with existing systems, and scalability;
(ii) it needed control and ownership of source code, intellectual property, and security;
(iii) there were long term costs associated with total cost of ownership and vendor lock-in; and (iv) it envisaged competitive advantage related to the system unique features, speed & agility, and market differentiation.

Implementation approach
As a strategy, the team executes "Big Bang" implementation for the minimum viable product and "incremental" Implementation for all additional modules and enhancements.

Three levels were created for the project management framework:
    1) Steering Committee for project direction;
    2) Project Implementation Committees for project management; and
    3) Project Team which comprises the Functional Lead, Technical Lead, Change Manager, Module Leads, and Team members.

Management of the core components of the PM Framework

Risk management

ZRA avoids programs, projects and activities whose risks have not been assessed and mitigated. The PIC is responsible for the management of the risks within a project under which it falls. The PICs make risk-based decisions in determining project direction, taking into consideration both opportunities and threats in pursuit of the envisaged benefits.

Development

The Authority organizes self-organizing teams, scrum sprints, daily standup-meeting, and pause & reflect meetings.

System testing & quality assurance

The Project team (1) implements coding standards as international best practice, (2) carries out Code reviews, i.e. all changes are reviewed by a separate before integration into the main system; (3) conducts three full end-to-end testing stages before deployment to production; (4) continuously updates test cases in line with new features and requirements, (5) ensures that the business team performs independent tests before deployment to production, and (6) plans to implement automated testing using Selenium Testing Tool.

Change management

This involved internal stakeholder engagements, external stakeholder engagements, and training. A power-interest grid was then developed, which defined the stakeholders to be monitored, kept informed, kept satisfied, or managed closely.

A three-layered Change matrix was drawn: (i) Corporate Change Management, headed by the Commissioner General and senior managers; (ii) Divisional and Departmental Change Management, headed by the heads of department and Change managers; and (iii) Project Driven Change Management headed by the Project Manager and Project teams.

Challenges

The Authority encountered several background issues related to change management:
   i)   lack of communication around the changes;
   ii)   too many changes happening;
   iii) the impacts of change on taxpayers, staff, processes and systems;
   iv)   lack of commitment of staff and middle management to change management;
   v)   need for internal and external stakeholder engagements about changes;
   vi)   conflict between business as usual and project work;
   vii) lack of funding for change management plans;
   viii) lack of support for change management at divisional level;
   ix)   change management planning not part of divisional strategic planning session; and
   x)   lack of training for staff on change management

Mitigation strategies

ZRA has devised solutions to some obstacles faced in the automation process:

1. Skilled staff retention: ZRA management has designed a policy for project staff to be compensated differently from other staff
2. "First time development perception – can they do this?" attitude: The IT team developed small in-house solutions that acted as a proof of concept and showed the team's competence.
3. Inadequate budgets: Management used savings from payments that were being made towards maintenance of decommissioned system.
4. Project staff burnout and fatigue: Through team building exercises, leave, and staff welfare activities have been incorporated in the schedules.

Lessons learned
The Business should take the lead in the process i.e., development of system user requirements etc.
1. Project team should be skilled enough to handle the developments of systems.
2. It is imperative to get the correct infrastructure to support the developments (servers etc.).
3. Timelines must be realistic, according to scope to ensure quality products.
4. Strong governance required to control timelines, quality and cost of the products and management of stakeholders.
5. Create a deliberate retention policy for project staff to maintain consistency.
6. Adequate budget should be allocated for development of a proper systems.
7. Test the system thoroughly and involve end users all the way.
8. Change management should start from the word go; seek help and keep learning (benchmarking).

Future steps
ZRA plans to transition from electronic fiscal devices (EFDs) to the Smart Invoice in 2024. Unlike the EFDs which are limited to VAT and Insurance Premium Levy, the Smart Invoice will extend to additional taxes and levies. It will manage invoices and inventory data electronically and transmit the information directly from the taxpayers to ZRA.

The Authority is turning to data and AI as a solution to the compliance challenge of ascertaining accuracy of the tax declaration.

E.   South Sudan: Digital solutions for tax administration

Overview
In its mission to mobilize non-oil revenue for national development, the South Sudan Revenue Authority (SSRA) has set three strategic objectives:
1. To leverage ICT to transform its processes by acquiring ICT infrastructure and improving disaster recovery and security, Internet connection, and the enterprise resource planning system;
2. To improve internal processes to enhance organizational efficiency by redesigning and documenting core business processes and to develop ICT strategy and service standards; and
3. To improve data quality, analysis, and analytics by developing and implementing business intelligence and data analytics strategy, and by establishing an enterprise data warehouse.

SSRA has rolled out some computerized tax administration systems to support tax services and compliance, which are expected to enhance efficiency in tax administration and improve taxpayer access

to SSRA services. Electronic filing of returns started in 2012 with the introduction of a client-based data entry and management process called e-Submission. In 2021, the process was upgraded to the Web-based e-Tax for online registration, filing, and payment submission. For payment, the Revenue Gateway System (Capital pay) facilitates transactions through e-revenue collection channels (i.e., banks).

To facilitate trade and control, in 2022, SSRA rolled out the Customs Integrated System (e-Customs) to simplify the process of cargo clearance through electronic submission of documents, processing and communication as well as the Electronic Cargo Tracking System to simplify tracking of transit goods.

Challenges:
1. Poor ICT infrastructure i.e., poor system availability and performance, and non-scalability due to monolithic system architectures, which causes taxpayer inconvenience from data resubmissions, and loss of revenue due to minimal data validation.
2. Weak commercial banking system, characterized by high transactional fees and low coverage.
3. Poor sustainability arising from inadequate third-party information systems and budget allocation for digital transformation.

<u>Future steps</u>
SSRA envisages that improvements in the information system will (a) simplify the filing process and reduce non-filers; (b) improve integrity through less human contact; (c) increase capability in data analysis and efficient utilization of human resources; and (d) improve user experience and enhance revenue collection.

It plans technological enhancements in three aspects: (1) performance through internal and external systems integrations as well as standardization of development practices; (2) system availability and scalability by implementing a reliable data centre and modular architecture; (3) enhanced security and usability through standardized security services for identity; and (4) access management and consolidation of taxpayer services into one portal to simplify the usability and accessibility of systems.

Once the budget allows, the Authority will introduce electronic fiscal devices management system (EFDMS) for compliance and monitoring, and electronic tax stamps for monitoring volume of imports and production of excisable goods. It will then automate data validation, beginning with validation of VAT data from EFDMS.

As a way forward, SSRA will focus on further modernization of its IT infrastructure, extensive integration with external stakeholders for data sourcing and validation, business process re-engineering, data analytics, risk management and planning, and artificial intelligence.

F.   Malawi: Digital technologies for improved taxpayer services

Overview
The manual and time-consuming filing and payment methods, with limited options for taxpayers to access tax services, meant overly long queues and working hours, jammed due days, delays and backlog in processing payments, and returns prone to errors and data loss. Malawi Revenue Authority (MRA), in its 2012 strategic plan, sought to explore how technology could be used to improve taxpayer services, mainly the payment of taxes.

Measures introduced

MRA had to ensure that the necessary infrastructure was in place, i.e. a stable data centre, and then the relevant applications. The digital taxpayer services promised convenience and efficiency, enhanced accuracy, improved communication, and greater accessibility. MRA has since introduced ASYCUDA ++, ASYCUDAWorld, SAS II, and Msonkho Online (a web based integrated tax administration system for domestic taxes).

As of now, online tax return submission is almost ubiquitous; e-filing and e-payment stand at 70 percent and 100 percent, respectively. MRA has introduced Chatbots & Virtual Assistants i.e. "Yankho" on Website and "MyTax" on Telegram. 70 percent of MRA services are on online portals, which offer a one-stop shop for taxpayers to access tax information, file returns, make payments, and track their tax status. The Authority also offers user-friendly mobile applications that allow taxpayers to manage their taxes on the go, further enhancing convenience and accessibility. Currently, 50 percent of domestic taxes and 90 percent trade taxes use mobile services.

Lessons learned

In its digitalization journey, MRA has taken some notes.
1. Digital divide: Not all taxpayers have access to reliable internet or digital devices which calls for strategies to ensure inclusivity. Internet penetration in the country is still low, at 24.4 percent.
2. Cybersecurity: The tax administration should institute robust security measures to protect taxpayer data and prevent cyberattacks. Malawi has a National ICT Policy, a National Cybersecurity Strategy, and the Electronic Transactions and Cybersecurity Act of 2016 in place.
3. Data Privacy: Clear data privacy policies and regulations are essential to build trust with taxpayers. This led to the Malawi Data Protection Act of 2023 to ensure accuracy, storage limitation, integrity, and confidentiality of information.
4. Change Management: Transitioning to digital services requires effective communication and support for taxpayers and tax administration staff. This calls for a Change Management Strategy and a Culture Change Initiative.
5. Accessibility: The administration should ensure that the solutions are accessible on various devices, and to cater to users with disabilities.
6. Multilingual Support: For a diverse population, as is in many African countries, the system should offer multilingual services.
7. User Experience: The administration should focus on user-friendly interfaces and intuitive design for a smooth and positive taxpayer experience.

Future steps

MRA plans to introduce pre-filled forms using data from previous filings or third-party sources, to further simplify the process and minimize data errors. It will then embark on data analytics and machine learning i.e., advanced data analysis to identify patterns and potential compliance risks, thus enabling targeted interventions and improved risk management.

MRA notes that in future, tax administration will employ
1) emerging technologies, i.e. AI, blockchain and big data hold immense potential for further streamlining tax administration;
2) personalized services by tailoring tax information and guidance based on individual taxpayer profiles;

3) predictive analysis, i.e. proactive identification of potential tax issues and customized solutions; and

4) continuous improvement in form of innovation to deliver a seamless and user-friendly experience.

G. Kenya: Use of data analytics for risk-based administration

Overview

Kenya Revenue Authority (KRA) launched the Revenue Administration Reforms and Modernization Program in 2004/5, and one of the program's six components was business automation.

In July 2005, KRA introduced the Electronic Tax Register system to enforce record keeping for business transactions, followed by electronic banking to expedite payment of duties and taxes through a secure electronic process. It developed the Common Cash Receipting System (CCRS) for direct revenue collection through commercial banks, which was interfaced with relevant KRA business systems. The CCRS allowed a single view of the taxpayer, reduced human intervention in the payments process, improved reconciliations, matched payment and bank reports online, and enabled real-time monitoring of revenue collection.

In September 2007, KRA introduced the Integrated Tax Management System (ITMS) and rolled it out in December 2008. ITMS allowed for the automation of the registration and issuance of PINs and enabled electronic filing for VAT and PAYE, and later, corporate tax, stamp duty, and turnover tax. E-filing became mandatory in October 2015. In 2010, improvements were made on ITMS through the development and implementation of the addition of 11 modules, which later formed the iTax system. In 2014, authority rolled out iTax, a user-friendly, web-enabled, secure application that provides fully integrated and automated administration of all domestic taxes.

The iTax system has the following modules:
- Taxpayer registration and external information management;
- Central parameters management and workflow management;
- Compliance and monitoring, and tax return processing;
- Technical support services and audit;
- Debt and enforcement and tax credits and refunds;
- Taxpayer account and payment processing plan;
- Security management and database management;
- Taxpayer services and portal; and
- Bank collection and management statistics and reports.

iTax allows the taxpayer to register, file, pay, and inquire about status online with real-time monitoring of accounts. Its access is restricted based on the tax category. iTax integrated with commercial banks (the KRA Payment Gateway), which enabled online banking and real-time access and updating of ledgers, among others.

In the same year, KRA launched a mobile phone application, the KRA M-Service platform, with two service components:
  i.   informational services – which enables taxpayers to access specific information from KRA by text message), and
  ii.   mobile payment of all taxes and e-slip generation for traffic revenue fees – which allows taxpayers to make quick, simple payments of a daily limit through their mobile phones.

KRA's sought some partnerships to propel the digitalization process:
  1. Government agencies to fast-track their digitalization processes, mainly under e-Government strategies and masterplans.
  2. The Swedish Tax Institute on the Data Warehouse & Business Intelligence project.
  3. Some technology companies in areas such as agile methodology and Design/Ideation processes.
  4. Educational institutions to provide trainings in data science and software development.
  5. OECD's Peer-to-Peer Knowledge Transfer program in form of developed country Vs. developing country and developing country Vs. developing country.

Use of Data Analysis for Risk-Based administration
According to KRA, its digital system churns substantial amount of data, and the authority leverages data analytics to facilitate compliance and enforcement initiatives. Whereas data analytics is still in the early stages, there is potential for revenue improvement. The Compliance Risk Committee is responsible for the development of Compliance Improvement Plan that contains risk focus areas.

The data are used for
  • Evaluation of operating context i.e. KRA's internal and external environment as well as operation systems.
  • Risk identification i.e., to identify patterns and trends of potential noncompliance across four pillars – registration, filing, reporting, and payment.
  • Identification of risk parameters and development of risk profiling rule i.e., analysis of taxpayer data based on pre-defined risk parameters (business rules) to establish the likelihood of risk occurring (risk scores) for effective compliance and audit case selection.

The risk engine and case election system are built within the data warehouse architecture and this serves all functional areas of the Tax and Customs Administration. The system embeds the following automated parameters: non-submission of returns; variation in profitability; existence of disposed fixed assets; and deviation of taxpayer gross and net profit margins from the industry.

In terms of value addition, risk-based prioritization of cases facilitates (i) optimal utilization of limited resources available for compliance enforcement and (ii) revenue enhancement through identification of cases with the greatest revenue potential for compliance effort.

Future steps
KRA plans to, among others:
  1. Undertake continuous modernization of its business operations by implementing various IT tax management systems and scaling up automation of tax administration procedures to improve transparency and customer service.

2. Full rollout of electronic Tax Invoice Management System (e-TIMS) to restrict income tax and input VAT deduction to compliant invoices and enable realtime monitoring of transactions.
3. Map rental properties, integrate iTax with National Lands Information Management System and use Mobile App for payment of tax to enhance rental income tax collection.
4. Integrate tax administration systems internally and with other Government systems to allow seamless exchange of information for a complete view of the taxpayers' economic transactions through Big Data analytics.

H. Rwanda: Foundations for better risk-based enforcement – Effective use of electronic invoicing systems

Overview
Generally, taxpayers were willing to file and pay taxes on the statutory due date, but were frustrated by the structural inefficiencies within the tax administration, as exhibited by long queues outside tax offices.

Digitalization Project Governance Outlook
The Rwanda Revenue Authority (RRA) has taken several steps to digitalize its processes. RRA's digitalization project consists of the following governance strands: compliance legal framework, stakeholder engagement, change management, risk management, strengthened organizational capacity, and quality assurance.

RRA has a single-entry point, MyRRA, an online platform used for the collection and management of taxes. MyRRA also offers taxpayer relationship management and has the systems below:
- E-Tax for administering domestic taxes i.e., filing and payment;
- Local government tax system i.e., for filing and payment of local government taxes;
- Electronic invoicing systems (EBM);
- Electronic cargo tracking system for tracking the movement of goods from the port to the destination;
- Electronic single window for faster clearance of goods in customs; and
- Data warehouse and business intelligence.

In 2004, RRA introduced licensed off-the-shelf software to support data management for taxpayers and facilitate tax return processing, enforcement, and auditing. It also introduced the Automated System for Customs Data (ASYCUDA ++), a customs operations and data system widely used among developing countries, allowing for automation of functions and greater control over core processes while improving data collection, management, and reporting.

In 2011, RRA rolled out e-filing and e-payment intended to eliminate the exchange of cash between taxpayers and tax officers, thereby accelerating the transition to a cashless economy. In the subsequent years, the authority:
a) Issued the Electronic Single Window (ESW), a system that allows firms to provide import and export information online. The system expedites information flow between trading firms and the government by eliminating redundancies in the submission of information at different entry points.
b) Created a mobile application for filing taxes and payments using feature phones to overcome limited connectivity and digital literacy among taxpayers; and mandated the use of electronic

billing machines (EBMs) by formal businesses with revenues above a minimum threshold to increase tax compliance and collect information for VAT collection.

c)   Entered a 25-year PPP with Rwanda Online Platform Limited to build the "Irembo" platform with the aim of fast-tracking the delivery of public services through digitalizing person-to-government (P2G) payments; then launched Irembo digital payment services.

d)   Developed an upgrade of EBMs (EBM 2.0), enabling it to be installed in commercial computers for free and elimination the high costs of buying these machines for businesses.

In 2019, RRA launched a live chat feature to support taxpayers, accessible through its website.

As a new member of the Global Forum on Transparency and Exchange of Information for Tax Purposes, Rwanda is undergoing an induction program on Automatic Exchange of Information (AEOI) – for systematic and periodic transmission of bulk taxpayer information by the source country to the residence country.

The case of VAT

RRA's VAT automation is worth noting. Firms had easy opportunities to fabricate input VAT claims as there was no system to verify input VAT claims, and only selective audits done. VAT evasion was mainly through false supplier TIN, photoshop of amount on receipt, submission of same claim multiple times, and submission of expired invoices.

Automation was considered key to addressing the challenges, and its initial stages were characterized by the following:

1. Automation started with VAT registered taxpayers. VAT is the largest tax type and yet had high non-compliance. Automation covered all categories of taxpayers, but the system was stand-alone.

2. RRA hired a consultant to define requirements and develop a bespoke inhouse system. The team developed a back office to receive and check data, and a communication protocol with taxpayer devices.

3. In 2013, RRA issued the requirements and technical specifications for EBMs to the taxpayers. It introduced the Certified Invoicing System e.g., POS device, connected to a Sales Data Controller (SDC). The system handled all categories of taxpayers so there were various solutions. Taxpayers were not forced abandon their systems since some services could not use the hardware gadgets; instead, taxpayers were encouraged to integrate their systems through SDC.

The overall approach in the implementation of the EBM entailed: issuance of requirements and technical specifications; criteria for certification of EBM suppliers (EBM1); legal instruments; composition of operations team; pilot phase; roll-out; validation controls; and formation of the EBM data analytics team.

Over time, there have been major improvements in the VAT automation:

1. In 2016, RRA instituted automation of controls. For instance, checks were done on inputs (say, if an invoice existed) before submission of VAT returns into the EBM system. It upgraded the EBM back end to enable supply chain management capability and integration with other RRA data, and added automation of declaration controls.

2. In 2018, RRA introduced Virtual SDCs for higher capacity and added sales validation and control. The declarant's turnover has to be at least equal to sales in EBM system, otherwise the declaration is

rejected. The system was upgraded to EBM Version 2 (EBMV2), a migration from hardware to software. In this, RRA encouraged taxpayers to use software and stopped importation of devices. It created software solutions (customized) depending on the nature of taxpayer business e.g., for smartphones, online EBM for service providers, and for supermarkets and pharmacies, a move that met both taxpayer and RRA needs.

3. There was free supply, training and installation of EBMV2 client software, but a taxpayer had to meet these minimum requirements to receive software: (i) a reliable internet connection (to link to RRA servers) and (ii) the computer and printer had to meet required specifications. The solution worked particularly well during the Covid-19 nationwide lockdown – RRA gave free services to taxpayers, while it had remote access to taxpayer data (hence better control of taxpayer activities). EBMV2 enables RRA to have real time access to taxpayer transactions. The system does not require fulltime internet connection as the system can work offline for limited duration (if system not reporting for 2 days, it shuts down until reconnected to Internet). It is worth noting that Rwanda has good internet connectivity as the Government installed fibre broadband across the country.

4. In 2019, a legislation that obliged e-invoicing even for non-VAT registered taxpayers was passed. RRA rolled out an e-invoicing campaign for all taxpayers, both registered and non-registered. Effective 2022, all expenses in income tax filing are validated through EBM system. RRA encourages taxpayers to purchase only from merchants that issue e-invoices, and expenses not supported by e-invoices are not considered for income tax purposes. This has led to an increase in the adoption of EBM.

Benefits realized
Among the outcomes, automation has enabled validation of sales for income tax purposes; income tax is controlled through VAT control on turnover, as there is e-declaration by all taxpayers, except for technical reasons. There has been integration of core systems, i.e. e-Tax and Customs single electronic window. Import VAT is controlled since Customs is linked to eTax (domestic tax) – once the goods are cleared, all stock appears in the taxpayer's invoicing system. RRA then monitors the movement of stock. Input VAT claims have to be supported by Custom documents generated by ESW.

As a result, VAT collections have tripled and CIT collections doubled over the last five years. With increased access to data, the number of VAT registered taxpayers has quadrupled. Further, the data science function has been established.

Future steps
RRA plans to:
• continue to adapt EBM to the market dynamics;
• conduct robust education and awareness campaigns;
• pre-populate tax returns for PAYE and VAT (that can improve user experience and lower the administrative burden on taxpayers);
• enable mobile access to taxpayers' accounts;
• build an online 'Frequently Asked Questions' (FAQ) portal;
• strengthen data science and analytics e.g., to analyse supply chains;
• integrate with local government taxes system to monitor compliance to trading license; and
• automate personalized SMS reminders.

References

1.   Assassa, A. and Sawaya, E. (2022). E-Tax Rollout in Ethiopia—A Challenging Road to Renaissance. Available at: https://news.bloombergtax.com/daily-tax-report-international/e-tax-rollout-in-ethiopia-a-challenging-road-to-renaissance

2.   Junquera-Varela, Raúl Félix, and Cristian Óliver Lucas-Mas. (2024). *Revenue Administration Handbook*. Washington, DC: World Bank.

3.   Njuguna, Ndung'u. (2020) Digitalization in Kenya Revolutionizing Tax Design and Revenue Administration: IMF, Chapter 10. Available at: https://www.oecd.org/tax/forum-on-tax-administration/publications-and-products/Kenya-Digitalisation-challenges-Feb-2020.pdf

4.   Rosengard, Jay. (2020) Tax Digitalization in Rwanda: Success Factors and Pathways Forward. Available at: https://btca-production-site.s3.amazonaws.com/documents/507/english_attachments/Tax_Digitalization_in_Rwanda_Success_Factors_and_Pathways_Forward.pdf?1606765795

5.   Rwanda Revenue Authority (2022): RRA introduces MyRRA, a unified system for enhanced taxpayer services. Available at: https://www.rra.gov.rw/en/details?tx_news_pi1%5Baction%5D=detail&tx_news_pi1%5Bcontroller%5D=News&tx_news_pi1%5Bnews%5D=1682&cHash=44e5bbed093f6c298f9cde9e38ed4191

6.   The National Treasury & Economic Planning (2024). Available at: https://www.pfmr.go.ke/kra-data-warehouse-business-intelligencedwbi-programme/

7.   World Bank Interviews with MoR (2023).

8.   World Bank Interviews with RRA (2021).

9.   World Bank-sponsored TaxTech conference for East Africa regional tax administrations, held April 2024, Addis Ababa.