Digitalisation and subnational tax administration in Nigeria

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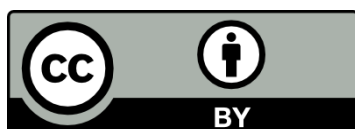Abdulsalam Mas'ud, Sani Damamisau Mohammed and Yusuf Abdu Gimba

Summary

Recently, there has been an expansion in the deployment of digital systems and digital IDs among taxing authorities. However, little is known about the extent to which such technologies are being adopted, or about whether the data from them is being used strategically to improve tax administration. Even less is known about this in the context of subnational tax administration, although this could be very relevant in some contexts, such as Nigeria. This study investigates the extent of the adoption and strategic usage of data from e-tax systems and digital IDs among state internal revenue services (SIRSs) in Nigeria. Data was collected through qualitative interviews conducted within the SIRSs – one from each of the country's six geopolitical zones, and within the Federal Inland Revenue Service (FIRS). The qualitative data from the interviews was evaluated using thematic analysis. The findings revealed that there is scope for improvement in the adoption and usage of data from e-tax systems and digital IDs among the SIRSs. It was also found that the extent of adoption and strategic data usage from e-tax systems by SIRSs likely improves states' per capita internally generated revenue (IGR), but similar insights on the impact of digital IDs have not been obtained. Lastly, it was found that there are some lessons SIRSs could learn from FIRS in terms of strategic use of data from e-tax systems and digital IDs. Specifically, SIRSs need to integrate an audit risk engine and machine learning for performing analytics into their e-tax systems, and also automate the estimation of annual credits for withholding tax suffered, tax refunds and penalties, as well as tax audit management including case selection, allocation of auditors and generating audit reports. Some policy recommendations are offered that are consistent with these findings.

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Acknowledgements

Acronyms

ACTG	African Centre for Tax and Governance
Bayelsa-IRS	Bayelsa Internal Revenue Service
BSIRS	Bauchi State Internal Revenue Service
BVN	Bank verification number
CBN	Central Bank of Nigeria
CGT	Capital gains tax
CRF	Consolidated Revenue Fund
E-TCC	E-Tax Clearance Certificate
ESIRS	Enugu State Internal Revenue Service
ETS	E-tax system
FIRS	Federal Inland Revenue Service
FRSC	Federal Road Safety Commission
HMRC	UK HM Revenue and Customs
HNWI	High net worth individuals
IGR	Internally generated revenue
IRS	Internal Revenue Service
ITAS	Integrated System of Tax Administration
JTB	Joint Tax Board
KAD-IRS	Kaduna Internal Revenue Service
KW-IRS	Kwara Internal Revenue Service
LIRS	Lagos Internal Revenue Service
NGF	Nigeria Governors' Forum
NGN	Nigerian Naira
NIBSS	Nigerian Inter-Bank Settlement System
NIMC	National Identity Management Commission

NIN	National identification number
PAYE	Pay as You Earn
PIT	Personal income tax
TIN	Taxpayer identification number
TSA	Treasury Single Account
WHT	Withholding tax

Introduction

In the past decade, national and subnational tax administrations have increasingly shifted to more digitalised tax operating models. This significant shift is noticeable in many advanced economies, which use the internet as both a source of tax information and a means of submitting tax returns; thus, digitalising tax administration through e-tax systems. The Organisation for Economic Corporation and Development (2020) views digitalisation of tax as the increased shifting of processes which were originally paper-based and partly manual to being digitalised. The digitalisation of tax administration through e-tax systems is evidently allowing greater sharing of data within tax administrations and within governments as a tool for enhanced analysis.[1] A leading factor in this accelerated trend is the pressure posed by the Covid-19 pandemic as technology systems and processes served as lifelines for disrupted tax functions (Brown 2021; Santoro, Amine and Magongo 2022; Santoro, Lees, Carreras, Mukamana, Hakizimana and Nsengyiumva 2022).

Nigeria is no exception to this strong global move towards the adoption of digitalisation of tax administration through e-tax systems. The country has embraced both digital systems and digital IDs in its tax administration. In 2017, the Federal Inland Revenue Service (FIRS) announced the introduction of six electronic tax services (e-services) for the convenience of taxpayers in Nigeria. This was achieved through the introduction of the Integrated System of Tax Administration (ITAS). The e-services included e-registration, e-stamp duty, e-tax payment, e-receipt, e-filing and e-tax clearance certificate (e-TCC). The introduction of ITAS was Nigeria's first step towards the digitalisation of tax revenue collection with the aim of facilitating real information sharing and data exchange among the relevant tax authorities and other stakeholders (Mas'ud 2019).

In addition to the digital systems used for tax purposes, the Nigerian government has rolled out different digital IDs including drivers' licence, bank verification number (BVN), national identification number (NIN) and taxpayer identification number (TIN). Registration for a TIN in the recent past has required submission of a BVN and a NIN, which signifies steps towards data integration. As a further step towards positioning the TIN, an executive bill was submitted to the Nigerian Senate on 7 December 2021 which requires presentation of a TIN to be mandatory before opening a bank account (Omorogbe 2021). Therefore, with the improvements to tax systems that can be attributed to electronic systems, these measures will assist tax authorities in Nigeria to leverage electronic means to record taxpayers' basic information accurately so as to collect taxes from them when due with fewer problems. On a positive note, some state internal revenue services (SIRS) are also advancing their automation efforts. For instance, Lagos Internal Revenue Service (LIRS) has made significant strides in digitalising tax administration through the introduction of e-tax systems. These include the automation of the process of generating individual taxpayer IDs which is considerably simplified and more user friendly through the LIRS e-Tax system. The service has also been accepting personal income tax (PIT) returns through online filing since 2019 (Obayomi 2019).

Despite noticeable efforts in some states, there are still challenges in the adoption and strategic data utilisation of e-tax systems at subnational level in Nigeria. This is because most tax administrations have failed to keep up with the pace of change orchestrated by the digital transformation brought by the new system due to inadequate digital capacity, including the knowledge base and infrastructure to track, monitor, and optimise tax collection

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[1] Examples of countries using significant amounts of data in tax administration are the United States of America, Mexico, Spain, Costa Rica, Australia and the United Kingdom, all of which have noticed a tremendous impact on their systems of tax administration and collection (Collosa 2021).

effectively, as well as political will from administrators (Ike-Muonso 2022). Despite the challenges of IT adoption by subnational tax administrations, some studies have been undertaken with respect to this new system. However, they have centred on the demand side of digitalisation of tax administration (Mas'ud 2019; Efobi, Beecroft, Belmondo and Katan, 2019; Santoro, Amine and Magongo 2022), focusing mostly on investigation into the readiness or acceptance of this new technology by the end users who are, ultimately, the taxpayers. Hence, there is a need to consider the supply side of these technologies from the perspective of subnational taxing authorities who are lagging behind in the adoption and data usage processes.

This research aims to answer three research questions: (i) to what extent have subnational tax authorities adopted IT systems and how are they strategically utilising data from those systems? (ii) Is there a correlation between IT adoption and tax performance among subnational tax authorities?[2] (iii) What lessons can be learned from FIRS by subnational tax authorities? To answer these questions, both primary and secondary data was used. Primary data was collected through six interviews conducted with staff from six SIRSs and one interview with staff from FIRS. Secondary data was collected from the BudgIT *State of States Report*[3] for internally generated revenue (IGR). Thematic data analysis was used to qualitatively analyse the primary data, providing insights on the extent of IT adoption and strategic data usage to answer question one, as well as insights on lessons that can be learned from FIRS by subnational tax authorities to answer question three. The secondary data was used as one of the criteria for selecting the states with the lowest and the highest IGR to compare IT adoption and tax performance.

The key findings regarding the research questions are threefold. Firstly, there are gaps in IT adoption among SIRSs, particularly in terms of automating the refund of tax credits or overpaid tax, as well as audit processes. Some SIRSs still have parallel filing using both online and offline processes, and there are also issues of using multiple IDs, not adopting social media as digital IDs, and lack of a legal framework for data exchange. Regarding data usage, it was found that the data analytics were not performed using an e-tax system, but rather through data downloaded from the system.[4] The IT systems used by most SIRSs are not used for tracking the performance of tax audit teams and benchmarking, and external collaboration for data sharing and exchange is lacking, especially between SIRSs and private sector organisations such as banks. Secondly, in terms of a correlation between IT adoption and tax performance, it was found that states that have gone far in digitalising their tax payment systems and strategic data usage are more likely to generate more revenue than those at an early stage of digitisation. Lastly, in terms of lessons that could be learned from FIRS by subnational tax authorities, it was found that the FIRS TaxPro Max has inbuilt structures relating to audit risk engines and machine learning, which are used to perform analytics. The FIRS system also automates the estimation of annual credits for withholding tax (WHT) suffered, tax refunds and penalties, as well as tax audit management, including case selection, allocation of auditors and generating audit reports. These features, which increase efficiency in tax administration, are often lacking in SIRSs' e-tax systems. This study's findings contribute to the literature in several ways. Firstly, earlier studies on IT adoption in tax administration centred on the demand side by examining the taxpayers' perspective (see Mas'ud 2019; Efobi *et al*. 2019), though a few recent studies look at the supply side from countries other than Nigeria, such as Senegal (Czajka, Kondylis, Sarr and

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[2]   An earlier study from the demand side of the system undertaken by Mas'ud (2019) confirms the users' trust in using the system, which in essence signifies their willingness to support it. From the tax authorities' perspective, it is logical to believe that the data has some level of reliability. Taxpayers' data is subjected to assessment and audit which improves its reliability.

[3]   https://yourbudgit.com/wp-content/uploads/2021/09/State-of-States-report-2021-web.pdf

[4]   Unlike in FIRS, which performs analytics on the e-tax system, in SIRSs analytics are performed on Excel by using the data downloaded from the system.

Stein 2022), and Uganda and Sierra Leone (Occhiali, Akol and Kargbo 2022). This study addresses an important gap in the literature by considering the supply side digitalised tax administration system from the perspective of the tax administration itself. Secondly, there is also a gap in the capacity of tax authorities at subnational level to understand strategic data usage from e-tax systems and use it to improve tax administration; this study bridges this gap within the extant literature by exploring the extent of strategic data usage for efficient tax administration. Thirdly, although some studies such as Ajaero (2018), Ezugwu and Agbaji (2014), Olaoye and Awe (2018) and Santoro, Amine and Magongo (2022) have examined the relationship between IT adoption and tax performance using secondary time series data, this study explores more deeply by conducting interviews as well as cross-tabulating interview results with cross-sectional data to understand the correlation between IT adoption and tax performance. This approach not only offers a deep dive but also provides more informative findings. Lastly, the study also fills a gap within extant literature by providing a comparative analysis between national and subnational tax administrations on IT adoption and data usage, which highlights some lessons which the latter could learn from the former for improved tax administration.

From the literature, the available empirical evidence revealed the willingness of both individuals (Mas'ud 2019) and small business corporations (Efobi *et al.* 2019) to comply with e-tax payment systems. Specifically, for individuals, Mas'ud (2019) conducted a study on the acceptability of electronic filing of taxes by micro-entrepreneurs and found that this category is willing to use the system, but there are some challenges such as making it bilingual, simple and reliable. For corporate taxpayers, Efobi *et al.* (2019) investigated small business adoption of the ITAS in Nigeria and found that firms were willing to adopt the system, with business ownership characteristics such as the level of education, ITAS training and trust in the tax administration as the most important factors influencing adoption. While these categories of taxpayers are willing to file their taxes with SIRSs through e-tax systems, evidence is lacking on the extent of adoption of these digital tax payment systems among state taxing authorities. Simply put, while evidence has confirmed the willingness of the demand side to accept these technologies, evidence is not available on the capability of the supply side on the extent of IT adoption and strategic ways in which data from these technologies is being used.

Studies have also been conducted in relation to the adoption of digital IDs such as TIN among tax administrations. For instance, Olaoye and Awe (2018) conducted a study in Ekiti State Board of Inland Revenue looking at the impact of TIN on revenue generation using ordinary least square regression technique. The study made use of secondary data collected from the office of the Ekiti State Accountant General for the period 2006–2015 to ascertain the impact of TIN on the state's revenue generation. Its analysis, based on correlation and regression analyses, revealed that full adoption of TIN exerts a significant impact on the state's IGR. In another study, Ezugwu and Agbaji (2014) examined pre- and post-TIN revenue generation in Kogi State between 2003 and 2012. The study found that IGR prior to the introduction of TIN was not significant. However, the post-TIN era showed a tremendous increase in the IGR. A similar study was conducted by Ajaero (2018) on the effect of TIN on non-oil tax revenue, through a pairwise t-test statistical technique for analysing pre- and post-TIN years from 2000 to 2015. The results revealed a significant increase in total non-oil tax revenue with the introduction of TIN. While these studies examined the longitudinal impact of TIN adoption on revenue generation, the current study examines how various forms of digital IDs are being used and how data associated with such IDs is being used strategically by tax administrations.

There is justification for focusing on subnational tax administration. Firstly, Nigeria operates a decentralised tax administration structure with each level of government – federal, state and local – having its jurisdiction of tax collection. However, most of the recent studies examining IT adoption and data usage among tax administrations focused on countries with centralised

tax administration such as Senegal (Czajka *et al.* 2022), or Uganda and Sierra Leone (Occhiali *et al.* 2022). Thus, in offering new knowledge on IT adoption and data usage from a country with decentralised tax administration, this study addresses a gap in the literature. Additionally, it offers some insights on what lessons state tax administrations could learn from FIRS. To achieve this, the findings could be shared through avenues such as Joint Tax Board (JTB) meetings or IGR peer-learning events organised by the Nigeria Governors' Forum (NGF).

The analyses conducted have some policy implications. More profoundly, there is the need to amend the Nigerian Data Protection Regulation (2019) and its implementation framework of 2020, as well as the proposed Data Protection Bill (2020), through the integration of issues relating to data sharing and exchange between private sector organisations and tax authorities in Nigeria for routine tax administration. Policymakers at subnational level should also focus on providing adequate infrastructure, manpower training, and development to reduce the resistance of tax officials to IT adoption. Taxpayer knowledge and awareness should be improved to increase the adoption of e-tax systems across the states, and the subnational tax administrations could learn from FIRS in designing e-tax systems that integrate audit risk engines and machine learning for better understanding of tax administration trends and performance. Finally, SIRSs should also put into practice the automation of refunds of annual credits for withholding tax, imposition of penalties for noncompliance, and tax audits management, including case selection, allocation of auditors and generating audit reports online, all of which improve tax administration efficiency.

1 Context of the study

Nigeria is a lower middle-income country and the largest economy in Sub-Saharan Africa, with over 200 million population. The country has a decentralised tax administration system with different taxes collected by three tiers of government. FIRS is responsible for the collection of taxes due to the federal government, including companies income tax, petroleum income tax, value added tax, education tax, and withholding tax, while custom and excise duties are collected by the Nigeria Customs Service. At subnational level, various SIRSs administer and collect taxes due to state governments, mostly personal income tax and withholding tax. In addition, there are local government revenue committees (LGRC) which administer taxes due to local governments in the form of levies and permits. To ensure harmonisation and reduce the incidence of double taxation, the JTB advises in this regard and proposes amendment where necessary.

1.1 Integrated Tax Administration System

The ITAS was introduced in Nigeria in 2013 and implemented in 2017 to simplify and automate all tax administration processes (Efobi *et al.* 2019; Mas'ud 2019). It covered aspects such as taxpayer registration, tax assessment, tax payments, audit and investigation, and case management. It included six e-services: as e-registration, e-stamp duty, e-tax payment, e-receipt, e-filing, and e-TCC solution. Payments were facilitated by the Nigeria Inter-Bank Settlement System (NIBSS). The ITAS was in line with FIRS' mission to operate a transparent and efficient tax system that optimises tax revenue collection and voluntary compliance.

1.2 TaxPro Max

In 2020, FIRS introduced a tax administration solution known as TaxPro Max to ease tax compliance and replace the functionalities of ITAS in FIRS' tax administration. The system

became effective from 7 June 2021. It is intended for the filing of Naira-denominated tax returns. Like ITAS, TaxPro Max enables taxpayer registration, filing of tax returns, payment of taxes, automatic credit of withholding tax and other credits to the taxpayer's accounts, and issues tax clearance certificates as well as receipts for resident and non-resident taxpayers. The system also enables taxpayers to generate a document identity number (DIN). In summary, it provides a single view for taxpayers for all their transactions with FIRS. TaxPro Max is also connected with the Corporate Affairs Commission (CAC), a body responsible for the incorporation of companies in Nigeria. This means that the system has the capacity to retrieve accurate details of business incorporation as well as retrieve and validate TINs.

1.3 REVMATE

Most subnational tax administrations have adopted REVMATE as their IT solution for tax administration. REVMATE is an integrated revenue administration software that has a complete solution relating to taxpayer registration, filing of returns, tax audit and investigation, internal control and governance, as well as other services offered by SIRSs. The application comprises independent modular applications or an interface for seamless automation of other revenue collection functions such as motor vehicle registration and licensing, vehicle licence renewal or replacement, hackney permit, change of vehicle ownership, personal income tax – Pay as You Earn (PAYE) or direct assessment – withholding tax, and stamp duties, among others. This system was implemented in 2020 by Bauchi State Internal Revenue Service (BSIRS) and Kaduna Internal Revenue Service (KAD-IRS). Prior to this, these tax administrations had partial automation through silos of applications supported by e-banking and mobile money applications.

1.4 E-Tax

While some subnational tax administrations use REVMATE, others deploy e-tax software, in both web and mobile applications. Using an e-tax application, taxpayers can generate a bill reference by applying their payer ID and password to log in, then select the type of tax being paid; this could be PAYE, withholding taxes or other types of payment made to SIRSs. Upon generation of the bill reference, the taxpayer can make payment through any of the multiple payment gateways. Subnational tax administrations that use this application include Lagos Internal Revenue Service, which introduced the system in October 2019.

1.5 States' central billing system

In addition to REVMATE and e-tax applications, some subnational tax administrations introduced a central billing system to optimise their IGRs. This is a one-stop shop through which all kind of payments, including tax payments, must initially pass through for bill generation. These include payments for an indigeneship certificate (state citizenship document evidencing that one is an indigene), school fees, hospital bills, land registration, motor vehicle registrations, permits and licences. This system gives a state a picture of its revenue from all sources at a glance. It also supports tax administration through centralisation of all payments and reduced leakages of IGR. States that have this system in place include Enugu, Lagos and Kwara.

2 Data and methodology

2.1 Research design

The research design is qualitative. Both primary and secondary data were used. The primary data was collected through interviews conducted with the staff of state revenue authorities and FIRS,[5] while the secondary data was sourced from the BudgIT *State of States Report* for IGR. The BudgIT report was used as one of the criteria for selecting the SIRSs with the lowest and the highest IGR for comparison to address the study's third research question.

2.2 Sample selection

To answer the research questions, six state taxing authorities were selected using a three-stage criterion. Firstly, there are 36 states in Nigeria and each has a taxing authority. These states have been divided into six geopolitical zones. One state was selected in each zone, giving a total of six. Secondly, for a state to be selected, it must have implemented an e-tax system and be using digitalised ID in its tax administration. Lastly, where more than one state emerged from a geopolitical zone, a purposive selection was used in the selection of a state from two or more based on the researchers' expected safety concerns. Using these criteria, six SIRSs were selected and interviews conducted: see Table 1.

Table 1 Interview schedules

N	State	Revenue authority	Date
1	Kaduna	KAD-IRS	29/06/22
2	Bauchi	BSIRS	05/07/22 06/07/22
3	Lagos	LIRS	19/07/22 20/07/22
4	Kwara	KW-IRS	26/07/22
5	FCT, Abuja	FIRS	29/07/22
6	Bayelsa	Bayelsa-IRS	09/08/22 10/08/22
7	Enugu	ESIRS	11/08/22
Roles of interviewees: Director ICT, Director Tax Audit, Director Standards and Compliance, Director Revenue Operations, Assistant Director, PIT, Head Human Resources, Head Admin, Head Taxpayers Services[6]			

2.3 Data

To answer the first research question, data was collected from interviews with the staff of state tax authorities on: (i) whether the state has fully implemented a e-tax system; (ii) whether the system is integrated with JTB TIN; (iii) whether the system is linked with BVN; (iv) whether the system is integrated with state TIN; (v) whether the system is linked with any other form of digital ID; (vi) whether registration with the tax authority is carried out online; (vii) whether all taxpayers apply for a TIN online; (viii) whether the system is used for e-payment of fees, charges and bills; (ix) whether the system is used for tax filing, assessment and collection; (x) whether the system integrates all form of digital tax payments (personal income, capital gains tax (CGT), withholding taxes remittance); and (xi) whether payment is made online and whether this applies to all categories of taxpayers.

Upon the initial selection of six states, the BudgIT *State of States Report* for IGR data was used to divide the selected SIRSs into states with high and low IGR. Each state was then

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[5]   We did not interview tax agents and taxpayers as the paper is concerned with internal aspects of data utilisation from e-tax systems and digital ID systems, which external stakeholders such as tax agents/brokers and taxpayers are not privy to. Hence, only internal stakeholders – the staff of SIRSs and FIRS – serve as respondents.

[6]   In many instances, the top leaders were together with their subordinates and technical staff during the interview.

qualitatively cross-tabulated based on the extent of its adoption of an e-tax system and digital IDs as well as the strategic ways in which it uses data for tax administration. The aim was to obtain insights on the possible link between the extent of a state's adoption of an e-tax system and digital IDs, and its strategic data usage, and its tax performance. This data was used in answering research question two.

For the last research question, data was obtained from interviews conducted with the staff of the relevant departments of FIRS and SIRSs to compare the strategic ways in which data from e-tax systems and digital IDs is being used. The questions asked through the interview included but were not limited to: (i) using data from the e-tax system for audit sampling; (ii) using the data for preliminary analysis during tax investigation exercises; (iii) using the system for data analysis, including understanding the behaviour of taxpayers, taxpayer segmentation into high and low net worth individuals, and sources of income; (iv) using the data for automatic estimation of annual tax refunds and penalties; (v) using the system for tax audit management online, including case selection, allocation of auditors, audit reports; (vi) internal collaboration among the departments that use e-tax; and (vii) external collaboration with organisations with which e-tax and digital IDs are being operated (commercial banks, JTB, National Identity Management Commission) among many others. The aim is to explore why this collaboration can also be a determining factor in explaining how these systems do or do not strengthen tax administration.

While the researchers conducted interviews in person to collect data from four SIRSs and FIRS,[7] however, due to compliance with ICTD/IDS's 'due diligence' protocols, and in consideration of a movement control order by IPOB (Indigenous People of Biafra) in the Southeast region, data collectors were engaged for Enugu and Bayelsa states. For Bayelsa, the interviews were conducted by a staff member at Federal University Otuoke, Bayelsa State, while for Enugu, they were conducted by an academic staff member at Nnamdi Azikiwe University, Awka in Anambra State.

2.4 Analytical procedure

The analytical approach used was thematic analysis based on the themes generated from the key research questions. Primarily, three themes were identified. The first relates to the extent of IT adoption and usage of data from IT systems. The second relates to IT adoption/data usage and tax performance, while the last relates to the lessons which could be learned from FIRS by subnational tax authorities. For each of these themes, sub-themes were generated in line with the interview questions relating to the main research questions.

3   Thematic analysis of findings

3.1 Extent of IT adoption and strategic data usage

3.1.1 IT adoption

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[7]   Through a network established with participants during the NGF's IGR 'peer learning event', in which the lead researcher participated, contact details for the chairmen of all the selected SIRSs were obtained. Contact was also established with FIRS staff, who facilitated approval for the conduct of the study in FIRS during a one day seminar on the digitalisation of tax administration by the ICTD's Nigerian Tax Research Network (NTRN), in partnership with the African Centre for Tax and Governance (ACTG) in June 2022. The lead researcher presented his earlier research findings on e-tax filing at this seminar.

A review of the literature revealed challenges with respect to full adoption of IT in tax administration, as developing countries have a large number of businesses in the informal sector, resulting in incomplete filing; poor internet access also creates difficulties for e-payment, including taxes paid electronically (Mayega, Waiswa, Nabuyondo and Nalukwago Isingoma 2021). However, findings from subnational tax administrations in Nigeria revealed that e-tax systems have been adopted in all the administrations interviewed, except for refunds of overpaid taxes. All six SIRSs have implemented a digitalised tax system with respect to taxpayer registration, filing of returns, payments and audit selection. For instance, in LIRS, the system is used to detect early and late filers, and even non filers. It is also used to understand potential underreporting by comparing taxpayers in the same industry. This serves as a basis for flagging up cases for tax audit. An exception to this is KW-IRS[8] and ESIRS[9] which do not have an automated audit process. Regarding appeal procedures, all the SIRSs interviewed have automated their appeal process and taxpayers can accept or object to the appeal online. On the issue of refund of tax credits or overpaid tax, except for Bayelsa State IRS, no state has implemented a fully automated refund process. Only BSIRS has indicated its efforts in facilitating online refunds after tedious offline paperwork, while all other states will encourage taxpayers to opt for rollover or transfer to tax credit which can be offset against future tax liability.

The IT systems used by subnational tax administrations are also integrated with payments of fees, charges and bills. LIRS has pointed out that the integration of all e-payment into its system has enabled it to broaden its revenue base. Further, its access to the state's central billing system enables the service to easily scrutinise taxpayers' activities, including buying and selling of cars and purchase of land, among others, so as to assess the possibility of underreporting of income that may flag up a tax investigation.[10] Additionally, there are certain taxes which by Nigerian tax laws are within the jurisdiction of states. It is pertinent to understand whether some of these taxes, due to their nature or the size of the informal sector in a particular state, are still being paid offline and are not integrated into the e-tax system. The study found that the e-tax systems in the states interviewed integrate all forms of taxes: personal income tax, capital gains tax, withholding taxes and even the development levy in KAD-IRS, and citizenship certificate fees for KW-IRS. Interswitch, Remita, GTPay, and access payment are used as payment gateways when making instant payments on the SIRSs e-tax systems. Taxpayers can also generate a Remita Retrieval Reference Number (RRR) to make payments at any bank branch. In Bauchi State, payments are partly offline as they can also be made through the issuance of cheques by taxpayers. This has been made possible in order to provide taxpayers with robust means of making payments.

To support taxpayers that may encounter problems while filing their tax returns or making payments, tax authorities around the world often integrate a helpline and chat modules into the system. Consistent with this global best practice, it was found that all the SIRSs' e-tax systems, including REVMATE in Bauchi-IRS and KAD-IRS, e-tax software in Bayelsa-IRS and LIRS, and taxpayer self-service in ESIRS and KW-IRS, are using online real time chat systems on both the e-tax system and the services' social media handles, and the e-tax systems are also integrating helpline assistance.[11] In Lagos, there is also a tax calculator attached to the e-tax system; this is a form of module that assists the taxpayers to compute

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[8] 'No, often refunds and annual credits are applied offline but penalties are integrated on the system' (Director Tax Audit, KW-IRS, 26 July 2022).

[9] 'No. Not all are digitalised. The tax system is yet to be fully digitalised. Audit appeals and refunds cannot be made through the system online' (ICT Staff, ESIRS, 11 August 2022).

[10] 'E-tax is used for all payments. It is also integrated with the Motor Vehicle Administration Agency (MVAA) system used for e-tax motor vehicle related fees/penalties, and with the central billing system that handles all payments for the state. Thus, it broadens the base, it enables easy scrutiny of taxpayers' activities including buying and selling of cars, purchase of land, etc.' (Assistant Director, Regional Coordinator, Lagos Mainland, LIRS, 19 July 2022).

[11] 'There is [an] online real time chat system handled by the department of taxpayer services' (Executive Director, Administration, KAD-IRS, 29 June 2022).

their tax liability accurately. This provides some ease to taxpayers and improves the efficiency of the tax administration.

The study also found that the collaboration between JTB and SIRSs has helped immensely in automating the process of TIN generation. Except for Enugu State, which was found to have a parallel operation of online and offline TIN registration, all the remaining five SIRSs surveyed indicated that taxpayers' TIN registration is fully automated; this was facilitated through the help of JTB which has issued each SIRS with a unique login detail. This approach not only eases the process of TIN generation but also reduces duplication of taxpayer information. This collaboration between JTB and SIRSs increases exchange of information as the application process is integrated with the taxpayer's BVN, which is required to be provided during the application process. Providing a BVN implies that the service can access all the identification details contained in a taxpayer's BVN through the allocated TIN. In Enugu, although TIN application is partly offline and some taxpayers still apply for their TIN this way,[12] the application is integrated with BVN. The collaboration between JTB and SIRS is highly commendable, as technology reform must not be a stand-alone project, but rather built on as a part of a broad institutional strategy, where complementary reforms are designed. A clear sequencing of reforms is required to avoid redundancies and disorder (Okunogbe and Santoro 2022).

The study also found that SIRSs use more than a single digital ID. In addition to using TIN, the states have all developed their own personal digital ID. For instance, in ESIRS it is called Enugu State Social Benefit Number (ESBN); in KAD-IRS it is called KAD-IRS ID; in KW-IRS it is called KRIN; and in LIRS it is called P-ID for individual taxpayers and C-ID for corporate. These state IDs are in addition to the NIN and BVN which are used in all SIRSs. States like Bayelsa-IRS, Bauchi-IRS and Enugu-IRS have gone further and recognise a driver's licence as a digital ID and link it with their e-tax payment system. With the exception of Bauchi-IRS, none of the SIRSs use social media handles as a form of taxpayer identification. However, it was argued by Jacobs, Crawford, Murdoch, Hodges, Lethbridge, Jimenez, Osinski, Hinsz, Pulse and Kamenov (2013) that multiple identification numbers often increase the likelihood of error and/or fraud. Exploring further through the interviews, the current study found that the reason for the multiplicity[13] of these IDs is only for verification and confirming the accuracy of a taxpayer's identity, and that they are not used as separate IDs. However, state IDs are used for salaried taxpayers who do not have a JTB TIN. Although literature supports the use of a single ID (Jacobs *et al.* 2013), it was found that most state TINs are used for identification of salaried taxpayers who do not have a JTB TIN as ID. However, there is a need to ensure that all salaried taxpayers get a JTB TIN for unifying identify and ensuring consistency of ID. This will be particularly important in the event that salaried taxpayers transfer their employment to another state. Nevertheless, there is supporting evidence that integration of other IDs such as BVN or NIN will help bring an end to one of the key challenges of tax administration identified by Santoro, Munoz, Prichard and Mascagni (2022), that is, to identify the tax paying population, and to be able to reach them when needed. Large databases make it easier for tax administration to reach and verify the identity of larger segments of the taxpaying population.

It is important to note that among the SIRSs interviewed, TIN has not been made mandatory for salaried taxpayers. Only Bayelsa-IRS has mandated all salaried individuals who pay

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[12] 'No, it is partly offline. Some taxpayers still apply for TIN offline' (ICT staff, ESIRS). The offline application for TIN means taxpayers fill in details in the designated form. ICT personnel later input this information on the system and generate a TIN.

[13] The multiplicity of these IDs is for verification and confirming the accuracy of taxpayer identity only; they are not to be used as separate IDs.

taxes to obtain a JTB TIN;[14] all other SIRSs have assigned state IDs to salaried taxpayers who are under PAYE tax. The use of a JTB TIN by salaried taxpayers is likely to simplify tax administration, for instance, when staff of banks, companies or the federal civil service are transferred to other states, their JTB TIN can enable them to retain their tax identity. This will also make it easier to process their tax clearance certificate, especially in instances where they are transferred mid-way in the year, as the information from the preceding or succeeding tax administration obtained from the JTB TIN database can provide their complete annual tax payment data.

Another issue of importance is whether a TIN is used for opening an individual bank account or is required to be linked with such an account. It was found that only businesses are required to obtain a TIN for opening a bank account. Recently, there was contention as to whether the Finance Act 2022 required individuals to have a TIN before opening a bank account; the Presidency confirmed that this requirement is not included in the initial bill that gave birth to the act (Agbakwuru 2021). However, as the Finance Act often amends the provisions of these laws on an annual basis, there is a need to know whether states have made similar efforts with respect to the mandate for individual taxpayers to obtain a TIN for opening a bank account. Correspondingly, it was found that all the six SIRSs surveyed do not mandate personal income taxpayers to use a TIN when opening an account, but there is a mandate for corporate taxpayers that file returns with FIRS to use a TIN for this purpose. Interestingly, other countries such as Denmark, Finland, Iceland, Korea, Mexico, Norway, Poland, Portugal, Spain and Sweden have for over 20 years required a TIN to open an account (OECD 2020): the aim is to improve access to bank information for tax purposes. Additionally, the findings from the study revealed that individual taxpayers in Nigeria are not mandated by SIRSs to link their bank accounts with their TINs.

There are many digital IDs with a large database that have the potential to collaborate with subnational tax authorities; for instance, the BVN database with over 54 million of Nigeria's population registered (NIBSS 2022). Linking the SIRSs' e-tax systems with the BVN database is important for three reasons. Firstly, as the BVN database covers over 54 million Nigerians, it provides a good avenue for identity validation and verification for efficient tax administration. Secondly, when the appropriate legal framework is pursued, it will enable SIRSs to access taxpayers' financial data from the database, assisting them in tax audits and, when necessary, tax investigations. Lastly, accessing taxpayers' financial data will enable SIRSs to perform analytics to understand taxpayers' financial behaviour, including additional sources of income not reported, or disposing of an old asset or acquiring a new one, for which a capital allowance, including balance allowance and balancing charge, may be applicable. Other potentially useful databases include NIN, with enrolment of over 71 million Nigerians as of 30 December 2021 (NCC 2021), and Facebook, which joined digital identity alliance ID2020 in 2021 (Gruener 2021). It was found that SIRSs such as Lagos, Bayelsa, Bauchi, Kwara and Enugu linked their e-tax systems with BVN through an Application Program Interface. It was also found that most of the SIRSs surveyed have their system linked with NIN database.

The benefits to tax administration of this linkage and collaboration centre around ensuring taxpayer data consistency. However, access to taxpayer data in the BVN database is limited to personal data used for identity validation. Additionally, none of the subnational tax authorities integrate their system with social media handles such as Facebook, despite the fact that the revenue authorities of some advanced countries collaborate with these social media providers for tax administration purposes. The key example is the UK HM Revenue

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[14]   'It is mandatory for all salaried individuals who pay taxes to the state government to obtain their TINs. This makes it easy for information on a taxpayer to be retrieved at any point in time as the need arises. However, it is the usual practice for the revenue service to first of all enforce tax payment before subsequently driving taxpayers to register and obtain their TIN' (Staff, Bayelsa-IRS, 9 August 2022).

and Customs (HMRC) 'Connect' system, which gathered information from 30 different sources including Facebook (Gregan 2016). It will use social media to track tax evaders through observation, monitoring, recording and retaining internet data including data in blogs and social networking sites, particularly in instances where no privacy settings have been applied (Hills and Porter 2018). The US IRS has also been planning to explore using social media to detect tax cheats; it will be used for tax audit of previously identified cases in particular (Rohrlich 2018). However, the IRS is mindful that not all information posted on social media is genuine, and that some may be wrong or misleading. Rohrlich (2018) asserts that the IRS can use such information in the fight against identity theft, even though it is not clear how this would work.

3.1.2 Data usage

In terms of strategic usage of data from e-tax payment systems, it was found that all the six SIRSs studied are using data[15] from digitalised tax systems for audit sampling of all taxpayers under direct assessment using e-tax. This offers great assistance in carrying out the task of auditing under this form of assessment. However, for salaried taxpayers, the SIRSs are not using the e-tax system for audit sampling purposes; all salaried taxpayers are audited on a monthly basis and hence no sampling is required.[16] This is premised on the conviction that for PAYE taxpayers, annual return forms (H1) containing profiles, staff strength and income are being audited on a monthly basis across all salaried taxpayers. All SIRSs are using data from digitalised tax systems for preliminary analysis during tax investigation exercises. Specifically, in some instances, the services conduct a trend analysis of payments using data from digital systems to obtain preliminary insights on taxpayers ahead of going to the field either for audit or for investigative cases. This enables the services to crosscheck a taxpayer's status ahead of launching an investigation.

Some SIRSs report that they have been using the state central billing system to obtain information on taxpayers ahead of flagging up tax investigations. Three of the studied samples reported positive repercussions on the way audits are conducted, as the e-tax payment systems have on the whole enhanced the effectiveness of the services' audit strategies. This finding, which indicates that e-tax systems are contributing to tax audit, is consistent with the view of Okunogbe and Santoro (2022) that selecting audit cases using technologically data-driven approaches leads to a more targeted and efficient audit. It was also found that data from e-tax systems is used for the management of tax audits online especially in Bayelsa-IRS, ESIRS, KAD-IRS and LIRS. In particular, some of the revenue authorities automate case selection, allocation of auditors and audit reports. For instance, in Kaduna, it was found that KAD-IRS deployed both REVMATE and Interswitch databases for case selection based on potential noncompliance and underreporting; allocation of auditors is also made based on the industry of the taxpayer and the specialisation of the tax auditors. Reporting is also automated: reports for the case being audited can be automatically generated from the system. In LIRS, the allocation of auditors is automated and reports are generated online from the e-tax system. This makes retrieval of information on audit cases easier and frees up space for keeping a large volume of files within the office. The same applies to the ESIRS, where case selection and allocation of auditors are automated and audit reports can be generated online instantly. In the future, there is a need for automation to go further in the area of tax audit management so that it can enable tracking of tax audit teams at a glance. When this is implemented, benchmarking of performance among team members can be carried out, as well as identification of taxpayers who are likely to report late (Malkin 2022).

The SIRSs are also using the e-tax system for data analytics. BSIRS is using the e-tax system to segregate taxpayers based on the nature of businesses, their size, and their tax payment patterns. KAD-IRS is using the system to gain insight on the behaviour of taxpayers and their sources and trends of income. Bayelsa-IRS is using the system to categorise taxpayers into high net worth individuals (HNWI) and low net worth individuals, monitor patterns and trends of tax payments, and benchmark taxpayers. LIRS is conducting data analytics using the data from the e-tax system to understand early and late tax filers and trends in filing and payments, and to segment taxpayers into toppers, medium and small

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[15] 'It enables us to understand the behaviour of the taxpayers such as early and late filers. It also enables us to trend both filing performance and liabilities as well as segmentation of the taxpayers into toppers, medium and small taxpayers' (Director Tax Audit, LIRS, 19 July 2022).

[16] 'In our case, LIRS do not sample for tax audit. All organisations' payrolls [are] being audited. In this, all annual return forms (H1) containing profiles, staff strength and income are being audited. In essence, the e-tax improves audit efficiency, quality of data and audit strategy' (Director, Tax Audit, LIRS, 19 July 2022).

taxpayers. LIRS' categorisation of taxpayers into high and low net worth individuals is performed based on the source of income. For instance, taxpayers who own businesses, investment assets and have considerable influence in society are considered as HNWI. Although 6 million Nigerian Naira (NGN) (US$14,000) has been used as a minimum threshold for HNWI by some SIRSs, in reality the rate varies according to the taxpayer's state of residence (Deloitte 2017). Hence, it is important that the SIRSs follow global best practice by setting a threshold of income or assets as a basis for such classification. KW-IRS is undertaking taxpayer comparison analysis, variation analysis and top taxpayer analysis using data from the system. It also uses the system to crosscheck taxpayers' behaviours, net worth, and sources of income, as well as the nature of businesses, based on the historical data on the system. These analytics are performed mostly using Microsoft Excel,[17] a spreadsheet data analytic tool used for conducting different analytics including trends and patterns of tax payments. These findings are consistent with Khwaja, Awasthi and Loeprick (2011) and Okunogbe and Santoro (2022) that reported tax authorities using technology to generate data on taxpayer behaviour.

On the usage of e-tax systems for automatic estimation of annual withholding tax credits, refunds and penalties, it was found that out of the six SIRSs interviewed only Bayelsa-IRS was reported to have automated its system to estimate annual credits for withholding tax credits and refunds of either withholding tax credits or overpayment. On the issue of automating penalties, KAD-IRS and KW-IRS were found to have automated the imposition of penalties on defaulting taxpayers. When further investigating on why the estimation of annual withholding tax credits and refunds are not automated, it was found that, for withholding tax credits, taxpayers need to apply for a credit note, which is approved and issued upon verification. Refunds not automated either as every payment goes directly to the state's Consolidated Revenue Fund (CRF)/Treasury Single Account (TSA).[18] Thus, taxpayers need to apply through the Chairman of the service and this then needs to be approved by the state Accountant General. These processes are done manually and thus take a long time to complete. Therefore, most SIRSs automate the process indirectly by carrying forward such credits and refunds and offsetting them against future tax liability.

There is a challenge with respect to refunds of excess tax paid or credits remaining for non-continuing taxpayers who may transfer to another state and will not have the opportunity of setting off their credits against future tax liability. However, recent developments showed that withholding tax credits and refunds can be automated (Quiroga 2021). In Columbia, the automation of refunds is regulated by Decree 963, which was introduced in 2020 due to the advent of Covid-19, in order to reduce human interactions resulting from physical requests for refunds. SIRSs should work towards automation of withholding tax credits and refunds, although the process will require certain due diligence procedures to prevent potential sharp practices that may aim at taking undue advantage of the development.

The six SIRSs studied confirmed that they have been using the e-tax system for internal collaboration (data sharing) among departments. In some SIRSs the digitalised tax system holistically integrates each and every department, thus, each department has access to the others through the system and can access the necessary data for its use. However, in one of the SIRSs, it was found that data is only released on request, while in another the

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[17]   'There are no data analytical tools but the service is carrying out [a] trend analysis of tax payments using Excel. Thus, it is cross checking tax payments' (Head Tax Audit, BSIRS, 6 July 2022).

[18]   'KAD-IRS fully implemented a digitalised tax system with respect to filing of returns, payments, audit selection; however, [the] process of appeal and refund is still offline, although there is a plan to carry forward refunds and offset against future tax liability' (Executive Director, Revenue Operations, 29 June 2022).

'Refund of tax credits or overpaid tax are not fully automated. The simple reason is that all payments run directly into CRF/TSA of the state. Thus, refunds need to pass to the chairman, and the Accountant General's office. Due to these processes, taxpayers may opt for rollover or transfer to credit and set off against [their] next assessment' (Assistant Director, Regional Coordinator, Lagos Mainland, 19 July 2022).

collaboration is partly online and partly offline[19] as it still involves paper filing of returns; that is, parallel online and offline operation. In terms of engagement with external institutions for collaboration, and interconnection with government databases for data sharing (commercial banks, JTB, and NIBSS), all six services are sharing data with JTB. However, only one service collaborates with NIBSS and none collaborates with commercial banks for data sharing arrangements. Some SIRSs collaborate with payment gateways,[20] but not for data sharing, rather for payment facilitation. When enquiring about what is hindering collaboration with commercial banks, the only specified institutions that none of the SIRSs are collaborating with, it was found that such collaboration will require regulatory framework due to data protection policies preventing commercial banks from divulging information on their customers. Although Section 2.1 (ii) of the Nigerian Data Protection Regulation (2019) provides for statutory and legal exceptions to the application of data privacy and protection for the investigation of criminal and tax offences, this means that banks are only obliged by law to share data with SIRSs in the case of tax investigation but not for routine analytics.

3.2 Correlation between IT adoption and tax performance among subnational tax authorities

Table 2 presents the analysis of IT adoption and tax performance. It analyses the differences between states with high IGR and those with low IGR in terms of the extent of their adoption of e-tax systems. It attempts to understand whether important variation exists across these two categories of states. IGR per capita was used in categorising states with high and low per capita IGR. Those with per capita IGR of NGN5,000 and above are considered states with high IGR, while those whose per capita IGR is below NGN5,000 are considered states with low IGR. The selection of NGN5,000 is justified by the fact that it is the minimum amount considered for some development economic policies in the country, including the conditional cash transfer (CCT) programme. The per capita IGR data was obtained from the BudgIT State of States Report for 2021.

To analyse the extent of adoption of e-tax systems nine indices were used: full automation of taxpayer registration; full automation of TIN registration; full integration of fees charges and bills payments into e-tax systems; full automation of filing, assessment and collection; full integration of all forms of taxes including PIT, CGT and WHT among others into e-tax systems; full automation of all payments; full automation of refunds; paperless submission of tax return; and integration of a helpline into the e-tax system.

Some insights were obtained from this comparison, as shown in Table 2. States with high IGR score higher (green) in the nine indices relating to the full automation of e-tax systems. This indicates the likelihood that states that have gone far in e-tax systems generate more IGR than states with a low level of digitisation. This is consistent with the finding that digitalisation has aided countries like the United Kingdom and Estonia in the areas of tax assessment, payment, and reduction in tax evasions and underpayment of tax (Gutsol 2018; ICAEW 2019). However, apart from the likelihood of IT adoption and data utilisation, it could be that the high IGR in some states is attributable to other factors. For instance, richer states have more resources to invest in digital systems and thus have more potential for high IGR.

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[19] 'The service has five departments: Administration, Personal Income Tax (PIT), Accounts and Finance (A & F), Collection and Accounts (C & A), Research, Planning and Statistics (RP & S) and Chairman Chief Executive group, controlling certain activities under the direction of the Chairman/Chief Executive of the service. Collaboration between these units is partly online and partly manual. For instance, the tax audit unit has direct online collaboration with the collection and accounts unit and manual collaboration with the other units. Therefore, on the whole, there are collaborations between the units of the service which could [be] online or manual' (Head, Tax Audit, BSIRS, 5–6 July 2022).

[20] 'The payments of all [categories] of taxes is fully automated and applied to all [categories] of taxpayers. *Interswitch* is used as a payment gateway' (Interswitch Liaison Officer, KAD-IRS, 29 June 2022).

In Table 3, nine indices are used to analyse differences among states with high IGR and those with low IGR on the extent of their adoption of digital IDs. These indices are: using only TIN as a digital ID; linkage of e-tax systems with TIN database; mandating salaried taxpayers to have a JTB TIN; mandating banks to use a TIN when individual taxpayers are opening a bank account; TIN linkage with taxpayer bank accounts; linkage of BVN with e-tax systems; linkage of state TIN with e-tax system; linkage of e-tax systems with NIN database; linkage of e-tax systems with drivers' licence database and social media handles.

The analysis revealed no important variation among states with high per capita IGR and those with low per capita IGR with the extent of their adoption of digital IDs. This is not surprising considering that most of the initiatives relating to digital IDs are coordinated centrally through JTB; these include TIN, BVN and even NIN. Thus, it could be difficult to identify differences among SIRSs that remain under the umbrella of JTB. However, there is the likelihood of affecting intra-organisational variations in IGR on a year on year basis, as ascertained by Olaoye and Awe (2018) who found that full adoption of TIN exerts a significant impact on IGR in Ekiti State by comparing the pre and post adoption periods; likewise, the study of Ezugwu and Agbaji (2014) in Kogi State revealed that the IGR prior to the introduction of TIN was not significant.

Table 2 Analysis of differences between states with high IGR and those with low IGR in the extent of adoption of e-tax systems (ETS)

State internal revenue services	ETS full automated taxpayer registration	ETS full automation of TIN registration	ETS full integration of fees, charges and bill payments	ETS full automation of filing, assessment and collection	ETS full integration of all taxes PIT, CGT, WHT	ETS full automation of all payments	ETS full automation of refunds	No paper submission of tax return accepted	Integration of helpline	IGR per capita ranking 2021
Bayelsa-IRS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Low
BSIRS	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Low
ESIRS	No	No	Yes	No	Yes	Yes	No	No	Yes	Low
KAD-IRS	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	High
KW-IRS	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	High
LIRS	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	High

Note: IGR per capita data is obtained from BudgetIT (2021). IGR per capita below NGN5,000 is assumed as low while NGN5,000 is assumed high.

Table 3 Analysis of differences between states with high IGR and those with low IGR in the extent of adoption of digital IDs

State internal revenue services	Using only TIN as digital ID	Linking TIN with ETS	Mandating salaried taxpayers to have TIN	Mandating bank to use TIN for bank account opening	TIN linkage with taxpayers' account in banks	ETS linkage with BVN	ETS linkage with state TIN	ETS linkage with NIN	ETS linkage with drivers' licence and social media	IGR per capita ranking 2021
Bayelsa-IRS	No	Yes	No	No	No	Yes	Yes	Yes	No	Low
BSIRS	No	Yes	No	No	No	Yes	Yes	Yes	No	Low
EBIRS	No	Yes	No	No	No	Yes	Yes	No	No	Low
KAD-IRS	No	Yes	No	No	No	Yes	Yes	No	No	High
KW-IRS	No	Yes	No	No	No	Yes	Yes	Yes	No	High
LIRS	No	Yes	No	No	No	Yes	Yes	Yes	No	High

Note: IGR per capita data is obtained from BudgetIT (2021). IGR per capita below NGN5,000 is assumed as low while NGN5,000 is assumed high.

Table 4 presents the analysis of variation between states with high IGR and those with low IGR in their extent of strategic data usage from e-tax systems. It attempts to understand whether important variation exists across these two categories of states in the extent of their strategic data usage from e-tax systems. Similar to the analysis above, states' per capita IGR was used, with those states with NGN5,000 being categorised as high and those with less than NGN5,000 as low, based on the justification that NGN5,000 is the minimum amount for government financial and/or fiscal programmes, including conditional cash transfer to vulnerable citizens.

Table 4 uses eight indices to assess the extent of strategic data usage from the e-tax system. These are using the e-tax system for the following: audit sampling; preliminary analysis during field audit exercises; data analytics; automatic estimation of annual credits for withholding tax, tax refunds and penalties; tax audit management; information retrieval and analysis on taxes collected, unpaid refunds and unutilised credits and allowances; internal collaboration (data sharing); and external collaboration and interconnection with government databases for data sharing.

The insights from Table 4 highlight the likelihood of states with high IGR (green) having been better at strategic use of data from their e-tax system compared to states with low IGR. These insights corroborate with strategic data usage by HMRC through its 'Connect' system. This gathers information from banks in more than 60 countries, and can access Visa and Mastercard transactions, Land Registry records, online social networking, and the Charity Commission, among others. It has resulted in HMRC being able to identify understating income and underpaying tax, enabling it to recover over £3bn in taxes, and serves as the main trigger of UK tax investigation cases, contributing over 90 per cent of current cases (Baranov Associates 2021; Sanghrajka 2021; UK Government 2021). This has helped to reduce the UK tax gap from 7.5 per cent in 2005–06 to 5.3 per cent in 2019–2020 (Baranov Associates 2021; Sanghrajka 2021; UK Government 2021).

Table 5 gives important insights into the variation between states with high per capita IGR and those with low per capita IGR in the extent of their strategic usage of data from digital IDs. Six indices were used to make this comparison: using data from the TIN database for tax administration purposes; collaboration with the National Identity Management Commission (NIMC) for data usage from the NIN database; collaboration with the Central Bank of Nigeria (CBN) for data usage from the BVN database; collaboration with the Federal Road Safety Commission (FRSC) for data usage from the drivers' licence database; collaboration with the Independent National Electoral Commission (INEC) for data usage from the voters' card database; and collaboration with Visa and Mastercard, etc., to access taxpayer transactions to ascertain their lifestyle and estimate their tax liabilities.

The insights from Table 5 revealed that the extent of strategic data usage from digital ID databases could not provide a sufficient explanation of the size of states' per capita IGR. In fact, some states perceived to have low per capita IGR collaborate more with providers of digital IDs, though two of these databases, the drivers' licence database held by the FRSC, and the NIN database held by NIMC, do not have financial data like BVN and TIN. Moreover, evidence also revealed that the usage of data from these databases is limited to verification of taxpayer identity only. The SIRSs are not using these databases to access taxpayers' financial transactions, as obtainable in developed countries, especially the United Kingdom and Estonia (Gutsol 2018; ICAEW 2019).

Table 4 Analysis of differences between states with high IGR and those with low IGR in strategic data usage from E-tax systems (ETS)

State internal revenue services	Using ETS for audit sampling	Using ETS for preliminary analysis during field audit exercise	Using ETS for data analytics	Using ETS automatic estimation of annual credits for WHT and penalties	Using ETS for tax audits management	Using ETS for information retrieval and analysis, unpaid refunds and unutilised credits and allowances	Using ETS for internal collaboration (data sharing)	Using ETS for external collaboration and interconnection with Government databases for data sharing	IGR per capita ranking 2021
Bayelsa-IRS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low
BSIRS	Yes	Yes	Yes	No	No	No	Yes	Yes	Low
ESIRS	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Low
KAD-IRS	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	High
KW-IRS	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	High
LIRS	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	High

Note: IGR per capita data is obtained from BudgetIT (2021). IGR per capita below NGN5,000 is assumed as low while NGN5,000 is assumed high.

Table 5 Analysis of differences between states with high IGR and those with low IGR in strategic data usage from digital ID systems

State internal revenue services	Using data from TIN database for tax administration purposes	Collaboration with NIMC for data usage from NIN	Collaboration with CBN for data usage from BVN	Collaboration with FRSC for data usage from driver's licence	Collaboration with INEC for data usage from voter card	Collaboration with Visa and Mastercard	IGR per capita ranking 2021
Bayelsa-IRS	Yes	Yes	Yes	Yes	No	No	Low
BSIRS	Yes	Yes	Yes	Yes	No	No	Low
EBIRS	Yes	No	Yes	No	No	No	Low
KAD-IRS	Yes	No	Yes	No	No	No	High
KW-IRS	Yes	No	Yes	No	No	No	High
LIRS	Yes	Yes	Yes	No	No	No	High

Note: IGR per capita data is obtained from BudgetIT (2021). IGR per capita below NGN5,000 is assumed as low while NGN5,000 is assumed high.

3.3 What lessons can be learned from FIRS by subnational tax authorities?

With respect to the third research question, which seeks to understand the lessons that could be learned from FIRS by SIRSs in terms of strategic use of data from e-tax systems and digital IDs, the following findings were made.

Tax audit
Tax audit is one of the important functions of tax administration. Thus, the e-tax system needs to integrate this function for it to meet the needs of the supply side of the system. While the TaxPro Max system used by FIRS was designed to perform the audit function by integrating an audit risk engine for risk profiling and identifying flagged up cases that require tax audit, the study found that the SIRSs' e-tax systems do not have an audit risk engine that will support tax audit, especially risk profiling and identification of flagged up cases.[21] Hence, the need for SIRSs to develop a system similar to that of FIRS for better tax administration. Moreover, while TaxPro Max can be used for tax audit management, including case selection, allocation of auditors and generating audit reports online, some SIRSs indicated that their system has no such feature, indicating a weakness in terms of effective and efficient tax administration.

Data analytics
While SIRSs use data from e-tax payment for data analytics, they download data and use separate software for this, Excel in particular. In contrast, TaxPro Max has been designed with machine learning to perform analytics.[22] It has a module that can show those who file and those who do not. Where no payment is made after filing and assessment, the system can send a reminder. SIRSs need to learn from this development to improve their systems for enhanced tax administration through data analytics.

Performance tracking
TaxPro Max is embedded with a performance tracker module that links a taxpayer's account within the system with an account officer assigned from among the staff. It can alert the officer at each stage, including when filing, payment and review are made. The aim of the module is to check the performance of staff who are assigned as account officers to taxpayers, to understand whether they are tracking cases as scheduled. However, this important feature, which has the potential to improve efficiency in tax administration, is lacking within SIRSs systems: SIRSs could learn from this.

Risk profiling
While SIRSs use the data from e-tax systems for risk profiling, some data is often downloaded and analysed using Excel. However, for FIRS, TaxPro Max has inbuilt structures that use certain parameters such as turnover ratio, gross profit to turnover, expenditure to turnover, company income tax to turnover and even education tax to turnover for preliminary analysis prior to risk profiling.[23] Thus, SIRSs need to learn from FIRS by improving the design of their systems to catch up with this important aspect of tax administration.

Automatic estimation of withholding tax credits and penalties
TaxPro Max automatically computes balances for withholding tax based on declarations made by the taxpayer; these can be either debit or credit. With respect to penalties, the

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[21]   'TaxPro Max is integrated with [an] audit risk engine which supports tax audit including risk profiling and identifies flag-up cases that require tax audit' (ICT Personnel, FIRS, 29 July 2022).

[22]   'The system is embedded with machine learning. Currently, the system has a module that can show those who file and those who don't file, and where after filing and assessment no payment is made, the system can even send a reminder' (ICT Personnel, FIRS, 29 July 2022).

[23]   'TaxPro Max is made to perform audit function. In this, [the] audit risk engine will support tax audit including risk profiling and identify flag-up cases that require tax audit' (ICT Staff, FIRS, 29 July 2022).

system is fully automated: the provisions of tax laws are captured such that when taxpayers default, the system automatically charges them. However, apart from Revenue House Software used by Bayelsa-IRS, no SIRS has claimed to have automated the estimation of annual tax credits for withholding tax, tax refunds and penalties.

4 Conclusion and policy implications

This study has examined the extent of adoption and strategic use of data from e-tax systems and digital IDs among SIRSs in Nigeria. Generally, the findings revealed that there is scope for improvement in the adoption and strategic data usage of e-tax systems among SIRSs; that the extent of adoption and strategic data usage from e-tax systems vary among states with low and high per capital IGR, but that the same is not the case for digital IDs. Further, there are lessons which SIRSs could learn from FIRS with respect to the extent of adoption and strategic use of data from e-tax systems and digital IDs. Lastly, some factors are responsible for variations in the extent of adoption of e-tax systems and digital IDs. In line with these key findings, the study proposes some policy considerations as follows.

This study highlights the need for subnational tax administrations in Nigeria to improve their adoption and strategic use of data from e-tax systems and digital IDs. The study provides several policy recommendations for SIRSs to consider, such as automating processes for refund of tax credits, mandating salaried taxpayers to obtain a JTB TIN, and collaborating with private sector organisations for data sharing and exchange. Currently, external collaboration for data sharing and exchange between SIRSs and the private sector, such as banks, is lacking. Most collaboration occurs with similar government agencies and has been facilitated by a Memorandum of Understanding (MoU), a Non-Disclosure Agreement (NDA), and an Inter-Agency Agreement (IAA). Section 2.1 (ii) of the Nigerian Data Protection Regulation (2019) allows for legal exceptions to data privacy and protection in cases of tax investigations, but not for routine analytics. This study therefore suggests amending the regulation and its implementation framework to provide for data sharing and exchange for the purpose of routine tax administration, which should be integrated into the Data Protection Bill 2020 before its passage into enforceable legislation.

The study also found that there are differences between states with high per capita IGR and those with low IGR in the extent of adoption and strategic use of data from e-tax systems and digital IDs. States that have gone further in the digitalisation of tax payment systems and strategic data usage are more likely to generate more IGR than states with low levels of digitisation.

Lastly, the study recommends that the SIRSs can learn from FIRS on strategic use of data from e-tax systems and digital IDs by building certain parameters for preliminary analysis and risk profiling, embedding a performance tracker module, and checking the performance of staff who are assigned as account officers to taxpayers.

This study's uniqueness lies in its focus on the supply side of technology in tax administration within decentralised tax administration jurisdictions such as Nigeria. The study's implications suggest that lessons could be learned by subnational tax administrations from national tax administrations.

References

Agbakwuru, J. (2021) 'Finance Bill 2022: Nigerians Not Required to Provide TIN to Operate Bank Account – Presidency', *Vanguard Newspaper*, 12 December, https://www.vanguardngr.com/2021/12/finance-bill-2022-nigerians-not-required-to-provide-tin-to-operate-bank-account-presidency/

Ajaero, O.O. (2018) 'Tax Identification Number and Non-Oil Revenue: A Comparative Analysis of Pre and Post Tax Identification Number', *Journal of Accounting and Financial Management* 4.8

Baranov Associates (2021) 'What is HMRC Connect?', Baranov Associates, https://baranovassociates.co.uk/what-is-hmrc-connect/

Brown, B. (2021) 'The Tax Department Transformed', *KPMG Insights*, https://home.kpmg/xx/en/home/insights/2021/03/tax-department-transformed.html

BudgIT (2021) *State of States Report 2021*, BudgIT, https://budgit.org/post_publications/state-of-states-report-2021/

Collosa, A. (2021) 'Use of Big Data in Tax Administrations', CIAT/Inter-American Center of Tax Administrations, Blog, 1 September, https://www.ciat.org/use-of-big-data-in-tax-administrations/?lang=en#_ftn3

Czajka, L., Kondylis, F., Sarr, B. and Stein, M. (2022) *Data Management at the Senegalese Tax Authority: Insights from a Long-term Research Collaboration*, African Tax Administration Paper 27, Brighton: Institute of Development Studies

Deloitte (2017) 'Taxation of High Net-worth Individuals: Is this a Chase after Shadows?', *The Guardian*, 18 April, https://guardian.ng/features/tax-discourse/taxation-of-high-net-worth-individuals-is-this-a-chase-after-shadows/

Efobi, U., Beecroft, I., Belmondo, T. and Katan, A. (2019) *Small Business Use of the Integrated Tax Administration System in Nigeria*, African Tax Administration Paper 8, Brighton: Institute of Development Studies

Ezugwu, C.I. and Agbaji, J. (2014) 'Assessment of the Application of Taxpayer Identification Number (TIN) on Internally Generated Revenue in Kogi State for the Period of (2003-2012)', *Mediterranean Journal of Social Sciences* 5.20: 38

Gregan, D. (2016) 'Connect – A Digital Data Gathering System Created to Combat Tax Avoidance', *Euro Company Formations*, 26 January, https://www.eurocompanyformations.com/blog/connect-a-digital-data-gathering-system-created-to-combat-tax-avoidance/

Gruener, D. (2021) 'Facebook Joins Digital Identity Alliance ID2020', *Ledger Insights*, 26 August, https://www.ledgerinsights.com/facebook-joins-digital-identity-alliance-id2020/

Gutsol, O. (2018) 'Trends in Electronic IDs and EIDs Integration with Consensus AI Network', *Medium*, 2 February, https://medium.com/consensus-ai/trends-in-electronic-ids-and-eids-integration-with-consensus-ai-network-7899c73002e8

Hills, J. and Porter, S. (2018) 'HMRC Warns it Will Use Social Media to Track Down Tax Evaders', *Pinsent Masons*, 6 February, https://www.pinsentmasons.com/out-law/news/hmrc-social-media-tax-evaders

ICAEW (2019) 'Digitalisation of Tax: International Perspectives', https://www.icaew.com/technical/technology/technology-and-the-profession/digitalisation-of-tax-international-perspectives

Ike-Muonso, M. (2022) 'Subnationals, Digital Services and Taxation Opportunities', *Business A.M.*, 11 July, https://www.businessamlive.com/subnationals-digital-services-and-taxation-opportunities/

Jacobs, A., Crawford, D., Murdoch, T., Hodges, Y., Lethbridge, C., Jimenez, G., Osinski, D., Hinsz, S., Pulse, D. and Kamenov, A. (2013) *Detailed Guidelines for Improved Tax Administration in Latin America and the Caribbean*, USAID

Khwaja, M.S., Awasthi, R. and Loeprick, J. (eds.) (2011) *Risk-based Tax Audits: Approaches and Country Experiences*, World Bank Publications

Malkin, J. (2022) 'Top Seven Reasons to Automate Your Tax Process', *Tax Systems*, 4 April, https://www.taxsystems.com/blogs/top-7-reasons-to-automate-your-tax-process/

Mas'ud, A. (2019) *Acceptability of e-Filing of Taxes by Micro-Entrepreneurs in Northwestern Nigeria*, ICTD Working Paper 96, Brighton: Institute of Development Studies

Mayega, J., Waiswa, R., Nabuyondo, J. and Nalukwago Isingoma, M. (2021) *How Clean Are Our Taxpayer Returns? Data Management in Uganda Revenue Authority*, African Tax Administration Paper 24, Brighton: Institute of Development Studies

NCC (2021) 'NIN Enrolments Exceed 71 Million as Federal Government Extends NIN-SIM Verification to 31st March 2022', *Nigeria Communications Commission*, https://www.ncc.gov.ng/media-centre/news-headlines/1146-breaking-press-statement-nin-enrolments-exceed-71-million-as-federal-government-extends-nin-sim-verification-to-31st-march-2022

NIBSS (2022) 'BVN', https://nibss-plc.com.ng/1065-2/

Obayomi, W. (2019) 'LIRS Launches E-Tax', *KPMG Insights*, 7 September, https://home.kpmg/ng/en/home/insights/2019/09/lirs-launches-etax.html

Occhiali, G., Akol, D. and Kargbo, P.M. (2022) *ICT and Tax Administration in Sub-Saharan Africa: Adopting ITAS in Uganda and Sierra Leone*, ICTD Working Paper 148, Brighton: Institute of Development Studies

OECD (2020) *Tax Administration 3.0: The Digital Transformation of Tax Administration*, Paris: OECD, https://www.oecd.org/tax/forum-on-tax-administration/publications-and-products/tax-administration-3-0-the-digital-transformation-of-tax-administration.htm

Okunogbe, O. and Santoro, F. (2022) *The Promise and Limitations of Information Technology for Tax Mobilisation*, ICTD Working Paper 135, Brighton: Institute of Development Studies

Olaoye, C.O. and Awe, J.O. (2018) 'Impact of Taxpayer Identification Number on Revenue Generation in Ekiti State', *European Journal of Accounting, Auditing and Finance Research* 6.5: 35–46

Omorogbe, P. (2021) 'Finance Bill: No TIN, No Bank Account', *Nigerian Tribune*, 9 December, https://tribuneonlineng.com/finance-bill-no-tin-no-bank-account

Quiroga , A.F.P. (2021) 'The Automatic Refund as an ICT Tool for the Strengthening of the Tax Administration in Colombia', CIAT/Inter-American Center of Tax Administration, Blog, 1 June, https://www.ciat.org/ciatblog-the-automatic-refund-as-an-ict-tool-for-the-strengthening-of-the-tax-administration-in-colombia/?lang=en

Rohrlich, J. (2018) 'The IRS Wants to Use Social Media to Catch Tax Cheats', *Quartz, Economics – The Taxman Browseth*, 26 December, https://qz.com/1507962/the-irs-wants-to-use-facebook-and-instagram-to-catch-tax-evaders

Sanghrajka, J. (2021) 'HMRC's Connect Computer and Investigations', *Taxation*, 14 July, https://www.taxation.co.uk/articles/hmrc-s-connect-computer-and-investigations

Santoro, F., Amine, R. and Magongo, T. (2022) *Mandating Digital Tax Tools as a Response to Covid: Evidence from Eswatini*, ICTD Working Paper 140, Brighton: Institute of Development Studies

——, Lees, A., Carreras, M., Mukamana, T., Hakizimana, N. and Nsengyiumva, Y. (2023) *Technology and Tax: Adoption and Impacts of E-services in Rwanda*, ICTD Working Paper 153, Brighton: Institute of Development Studies

——, Munoz, L., Prichard, W. and Mascagni, G. (2022) *Digital Financial Services and Digital IDs: What Potential Do They Have for Better Taxation in Africa?* ICTD Working Paper 137, Brighton: Institute of Development Studies

UK Government (2021) 'HM Revenue and Customs (HMRC) Statistics and Methodological Annexes Relating to Measuring Tax Gaps', https://www.gov.uk/government/statistics/measuring-tax-gaps