

An evaluation of the digital response of tax authorities to optimise tax administration within the digitalised economy

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Abstract

This study provides insight into the international digital response of tax authorities to optimise tax administration within the digitalised economy. While the legislative and policy responses to the digitalisation of the economy establish a legal right to collect taxes, an optimised tax administration system to administer this legal right is critical. The research results reflect major discrepancies in the level of response and sophistication of tax administration systems that have been implemented among tax authorities globally. Furthermore, none of the participating tax authorities' tax administration systems currently reflect an optimised tax administration system, as defined, within the digitalised economy.

Key words: Information and communication technology; tax administration; digitalised economy; digital ecosystems; real-time tax collection; data science; data analytics

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1. INTRODUCTION

Unlocking the full potential of information technology and data has never been as critical for tax authorities as it is today (PwC, 2019, p. 12). The evolving digital landscape of the global economy has rapidly changed the world and it has since become critically important for tax administrators to redesign and adapt to these changes in order to ensure efficient and effective tax administration. The digitalisation of economies globally allows us to imagine a world where ‘tax is effortless’ and part of the ‘normal’ business and digital ecosystem. It allows the business world to move beyond a siloed, period-based and retrospectively reactive tax environment. A new reality can now be created where services are seamlessly integrated and where the integrity of the broader system is assured within these integrated services (OECD, 2019, pp. 51-57).

The digitalisation of the economy, however, also poses major challenges from a tax administrative perspective due to the transformation in business structures and the high dependence on intellectual property and intangible assets, as well as the disappearance of physical borders (ACCA, 2018, pp. 12-20). While the majority of tax authorities have made amendments to their tax legislation¹ and policies in order to take the changing business landscape associated with the digitalised economy into account, the enforcement of these legislative and policy amendments relies heavily on the data and technological response of the tax authorities. Technological innovations associated with the Third and Fourth Industrial Revolutions² therefore provide tax authorities with the opportunity to utilise these tools to their full potential. Emerging technologies are challenging revenue authorities to think differently about their business and to critically look at whether their products, services and business models are sufficiently aligned to support tax administration within the digitalised economy. This fundamental re-examination of the tax system as a whole reaches far beyond simply facilitating existing operations with new technologies or adding digital services to existing products and business processes (OECD, 2016, pp. 5-7).

‘Big Data’ technology offers tax authorities the opportunity to extract business value from existing data and to identify the relevant data for tax administration. Investment in innovative capabilities creates the opportunity to develop new and convenient services for taxpayers, together with the ability to create new tools that will assist the revenue authority to provide proactive services (OECD, 2016, pp. 7-10). Furthermore, the availability of (near) real-time data creates excellent opportunities for revenue bodies. Instead of capturing and analysing past transactions, revenue bodies can now consider how they might support tax assessment in (near) real-time. Tax authorities should consider options where features of the tax system are incorporated into the natural

¹ The international legislative reform in response to the digitalisation of the economy differs globally. In general, the majority of international tax authorities changed their indirect tax legislation with regard to VAT/GST to tax digital services at place of consumption. Other examples of reform relating to direct taxes include but are not limited to the (intended) introduction of digital services taxes, the introduction of the concept of digital economic presence and significant economic presence. Global consensus has, however, not been reached regarding corporate income tax reform in response to the digitalisation of the economy (OECD, 2018; OECD, 2020a, pp. 1-30).

² The phrase originated from an early analysis of the evolution of technology to enhance manufacturing processes. The Third Industrial Revolution is generally associated with computerisation and web-based interconnectivity and emerged in the 1980s and 1990s. The Fourth Industrial Revolution is often described as arising as ‘a result of the integration and compounding effects of multiple exponential technologies’. Examples of these technologies include, but are not limited to, artificial intelligence (AI), biotechnologies and nanomaterials (Penprase, 2018).

systems used by taxpayers for business purposes (for example e-invoicing) or to complete personal transactions, such as banking. These technologies also offer tax authorities the opportunity to differentiate the service offering to taxpayers and other stakeholders based on the inherent risk of a transaction, a taxpayer or an event (OECD, 2016, pp. 15-45).

As in the case of the transformation of any business information technology infrastructure, tax authorities, in general, also demonstrate a step-by-step approach to digital transformation, although not always in the same order. Various information technology maturity levels can be observed among international tax authorities, ranging from the mere digitisation of manual tax returns to a maturity level where tax returns are pre-populated for taxpayers and taxes are collected and verified in (near) real-time. Ernst & Young (2017, p. 1) categorised this journey towards a digital tax authority in terms of the following five maturity levels: 'E-file', 'E-accounting', 'E-match', 'E-audit' and 'E-assess'. While the correlation between revenue collection and effective tax administration systems is indisputable, the digital maturity levels of tax authorities globally are still at various levels that directly affect their ability to collect taxes within the digitalised economy (Regan, 2018, p. 1). Some of the leading countries with regards to digital tax ecosystems include, but are not limited to, Australia, China, Italy, Russia, New Zealand and the United Kingdom (HMRC, 2020, p. 1; Hartley & Stanley-Smith, 2019; OECD, 2019, pp. 11-16). However, on the other side of the spectrum, some African and Asian Pacific countries are only in the inception phases of digitising traditional tax returns for selected tax types.

The objective of the study was to analyse and evaluate the data and technology response of selected international tax authorities as a critical measure to optimise³ tax administration within the digitalised economy. The scope of tax administration, for the purposes of this study, included digital service offerings to taxpayers for tax filing and payment purposes, the provision of tax administration digital infrastructure and the collection and analysing of digital taxpayer information for tax administration purposes. Section 2 of this article describes the methodological assumptions and methods applied in this study. The results of the literature review are set out in section 3, and in section 4 the interview results are summarised. The recommendations based on these results are set out in section 5. The article concludes with section 6 and recommendations for future research are presented in section 7.

2. METHODOLOGY

A qualitative, inductive research approach was followed to collect data and knowledge in relation to international digital reform having the aim to optimise tax reform within the digitalised economy. First, a systematic literature study was conducted in order to collect data regarding the digital strategic objectives of eight global tax authorities. The data synthesis and analysis were conducted in order to identify five generic, digitally-driven strategic goals regarding tax administration within the digitalised economy. These goals were used to inform and formulate questionnaires that were used during the

³ For the purposes of this study, the 'optimisation' of tax administration, with reference to data and technology, refers to the best or most effective use of data and technology available, taking into consideration optimised data and technology architecture and design and the design and implementation of new and innovative tax ecosystems, as well as tax submission, payment and collection models. The 'advanced' response, as defined in sections 4.1 and 4.2 of this study, is regarded as an optimised tax administration system.

second phase of the study, which comprised interviews with officers of selected international tax authorities. The tax authorities selected for the literature review were those from Australia, China, Finland, India, the UK, the United States, New Zealand and South Africa. These tax authorities were selected based on the fact that they are regarded as leading tax authorities in terms of their response to the digitalisation of the economy and/or due to their global economic influence or leadership role among developing economies.

Following from the literature study, semi-structured, one-on-one and/or group interviews were conducted with representatives of 30 international tax administrations. The sample size of 30 tax administrations was regarded to be sufficient as the literature suggests that a level of saturation is reached between 20 and 50 interviewees.⁴ The sample was selected in two phases. Some tax authorities were specifically selected based on their data and technology response, as informed by literature and discussions with international tax administration experts. The sample was subsequently supplemented by a random sample selection. In order to ensure that the tax authorities that were selected were representative of the global population of tax authorities, the final sample that was selected was that comprising authorities considered representative of Africa, Asia, Australasia, Europe and North America. The classification of developed versus developing economies, as indicated by the United Nations (2020, pp. 165-166), was used. One selected participant from a country classified as ‘economies in transition’ according to the United Nations (2020, p. 165) classification was categorised under ‘developing economies’ for the purposes of this study. This was mainly due to the fact that the country shared a significant number of tax administration challenges with those of the other countries that were categorised as ‘developing economies’.

The interview questions and the purpose and background of the study were sent to the selected tax authorities together with the request for participation in the study. The participants were nominated by the tax authorities themselves and were from senior management level or above and were key role players within the field of data and technology. Interviewees were offered the option of being interviewed in person, in one-on-one or group sessions, by telephone, via secure digital communication channels and/or to respond in writing. The preferred approach of each participant was followed.

The majority of the content of the research data that was collected through the interviews related to the internal systems and internal information technology controls of the participating tax authorities. These systems and controls are privileged and confidential information and possible weaknesses in internal systems, processes and controls shared during the study by participants could put the participating tax authorities in a compromised position. In this context, it was agreed that the participants in the study would remain anonymous in order to ensure a safe environment for the participants, but simultaneously allow for the collection of accurate research data in order to advance documented literature in the research area without publicly exposing possible weaknesses within the participants’ internal control environment.

⁴ According to Green and Thorogood (2004, pp. 102-104), limited additional value is collected after interviewing 20 participants, whereas Ritchie, Lewis and Elam (2003, pp. 77-88) state that researchers should not interview more than 50 participants to enable the researcher to manage the complexity of the analysis and the communication of results.

The organisational development theoretical framework as developed by Kessler (2013, pp. 542-547) was applied during the study due to the fact that an external factor, the digitalisation of the economy, requires tax authorities to reform their tax administration systems to optimise tax administration within a new economic and technological environment.

The results of both the systematic literature review and the interviews were synthesised, analysed and evaluated in order to obtain a holistic view of the global digital response to optimise tax administration within the digitalised economy. The reliability and credibility of the research results were tested with the application of various triangulation methods, including the collection, synthesis, analysis and evaluation of data obtained from various data sources and the application of different data collection methods. The research results were discussed and reflected upon with and by independent experts in the area. Independent observers were invited to interviews and the results of both the literature review and interviews were tested against the available literature and the tax authorities' online service offerings.

3. LITERATURE REVIEW RESULTS: DIGITAL-BY-DEFAULT – A STRATEGIC DECISION

Technology, as well as the possibilities it provides, is a very powerful tool in the hands of tax authorities. In order to optimise and possibly transform the way that data and technology are used by tax administrators as a tax administration tool, tax administrations should first build a business strategy/model that is initiated by the tax authorities' strategic decision-makers (Hillman, 2017, pp. 31-33). An inference can therefore be made that the strategic goals of tax authorities will provide insight in relation to their intention to utilise digital tools with the aim to optimise tax administration. The strategic goals with a digital undertone were consequently identified and synthesised in order to determine what the strategic focus of the selected tax authorities is for at least the next five years and to identify the top five strategies notable per evaluated strategy. A synthesis of the identified strategic goals is set out in Table 1 below.

Table 1: Strategic Goals with a Strong Digital Focus for Selected Tax Authorities

Australian Taxation Office (ATO)	China
<ul style="list-style-type: none"> • Master Data Management (data backbone) that requires the development of data management infrastructure to cope with increasing data needs; • Insight by using analytics integration; • Data democratisation and visualisation; • Artificial intelligence and automation; • Data governance and ethics; • Improving the ATO IT systems; • Strengthening security capabilities (Australian Tax Office, 2019). 	<ul style="list-style-type: none"> • The reform of tax collection and administration systems; • Deepening tax reform by modernising tax systems and the utilisation of big data to support tax reforms; • Building consensus on international tax cooperation (State Taxation Administration, People's Republic of China, 2018).

<p style="text-align: center;">Finland (Vero Skatt)</p> <ul style="list-style-type: none"> • Ensuring tax revenue by acquiring and utilising tax data; • Ensure the ease of tax filing, fair tax assessment and a positive taxpayer experience; • Focus will be shifting to analytics and AI, global cooperation and interfaces as well as the acquiring and optimised utilisation of data (Vero Skatt, 2019). 	<p style="text-align: center;">HM Revenue and Customs (HMRC) UK</p> <ul style="list-style-type: none"> • Transformation of tax and payment systems for its customers; • Transforming its approach to compliance by designing and implementing digital systems and processes; • The optimised utilisation of data; • Acquire information from online intermediaries (HMRC, 2017, p. 1).
<p style="text-align: center;">India</p> <ul style="list-style-type: none"> • Developing data warehouse and business intelligence solutions; • Meeting the challenges of international tax administration by ensuring surveillance of fund flow (Income Tax Department: Government of India, [2011], p. 1). 	<p style="text-align: center;">New Zealand</p> <ul style="list-style-type: none"> • Information and intelligence gathering by ensuring that decisions and actions are intelligence-led; • Digital by fully embracing their place in the digitally connected world (Inland Revenue, New Zealand, 2019, p. 1).
<p style="text-align: center;">South Africa</p> <ul style="list-style-type: none"> • Modernise systems; • Provide seamless online digital services; • Make it easy for taxpayers to comply and difficult and costly not to comply; • Use data for insights, risks and improved outcomes; • Work with and through national and international stakeholders to improve tax systems (South African Revenue Service, 2020, pp. 11-24). 	<p style="text-align: center;">United States</p> <ul style="list-style-type: none"> • Simplify the process of tax filing, correction and payment as well as modernising and expanding of service channels; • Optimise the use of data and technology; • National and international collaboration in order to address global compliance concerns; • Advance data and analytics by updating data collection and retrieval capabilities and processes; • Drive efficient operations by modernising and integrating technologies and systems (US Internal Revenue Service, 2018, p. 1).

Source: Authors.

From the summary in Table 1, it can be deduced that the successful execution of international tax authorities' mandate and the achievement of the related strategic goals rely heavily on the optimised use and implementation of data and technology. It can be deduced that the digital focus of tax administrations is aimed at improving the following five key generic strategic goals.

1. Make it effortless to comply and a burden not to comply. The strategic goals of authorities of Finland, India, Australia, New Zealand, South Africa, the UK and the US mention the fact that tax authorities should ensure the ease of tax compliance and increase the difficulty to evade taxes. All of the strategies imply that tax compliance should be effortless for the taxpayer and burdensome for the non-compliant taxpayers. Digital strategic goals to acquire information and intelligence from online

intermediaries, third parties and other stakeholders are regarded as efforts to make tax non-compliance a burden.

2. Modernisation and integration of technology and systems in order to optimise tax administration. The modernisation and integration of technologies and systems in order to ensure agility, as well as a secure and accurate tax administration system, are a common goal among all eight evaluated tax authorities. This goal is specifically included in the strategic objectives of Australia, South Africa and the US, but implied indirectly by the rest of the evaluated countries.

3. Utilisation of data, engineering, analytics and science in order to improve taxpayer services, systems and operating systems. Although the details provided about how data will be utilised in order to ensure effective and efficient tax administration vary according to country, it is clear that optimal use of data for tax administration purposes is a key strategic objective. Australia, China, South Africa, the UK and the US specifically refer to data engineering, analytics and science in their strategic goals.

4. International cooperation among tax authorities, as well as other key stakeholders. The digitalisation of the economy enables taxpayers to globalise their business and financial presence. International cooperation and digital information-sharing among tax authorities and other key stakeholders globally will become a critical tool for optimised tax administration. While China, New Zealand, South Africa and the US are the only countries that specifically mentioned international collaboration, cooperation is implied by all other evaluated tax authorities and supported by international organisations, such as the Organisation for Economic Co-operation and Development (OECD).

5. Seven-hundred-and-twenty-degree (national and international) view of taxpayers. This approach allows tax authorities to have a full 360-degree view of the taxpayer, both domestically and internationally. This 720- (360 x 2) degree view will be achieved by data collection and sharing efforts on both a domestic and international level and by collaborating with various parties, ranging from international tax authorities to global financial institutions and digital platforms. While none of the above tax authorities specifically noted this goal in their strategic objectives, it can be deduced from the other four digital strategic goals listed above. International collaboration and the modernisation of technologies and systems, together with the optimisation of data engineering, analysis and science will inevitably result in a holistic national and international view of taxpayers. This enhanced view of taxpayers will mainly be achieved by the consolidated interaction of digital and legal systems, such as e-invoicing, Country-by-Country (CbC) reporting and the automatic exchange of information, among other things.

4. INTERVIEW RESULTS AND DISCUSSION

In order to identify the reform of international tax authorities towards their alignment to the five digital strategic goals listed above and optimised tax administration within the digitalised economy, interviews with representatives of selected tax authorities were conducted. In cases where limited response was provided by the interviewee, the data collected during an interview was supplemented with a review of existing literature. It became clear during the interviews that the digital response from the participating tax authorities from developed and developing economies differed substantially. In order to prevent the distortion of the research results, the data that was collected was documented in three categories to reflect the results for participants from developed economies,

participants from developing economies and the combined research results. The results are set out in sections 4.1 to 4.6 below.

4.1 Digital response to optimise the tax administration system within the digitalised economy

In order to obtain a general view of the participating tax authorities' information technology response to ensure optimised tax administration within a digitalised economy (strategic objective 1 as set out in section 3 above), the following question was posed: *'How did your tax authority respond, in general, from an information technology perspective, to ensure efficient and effective tax administration?'*

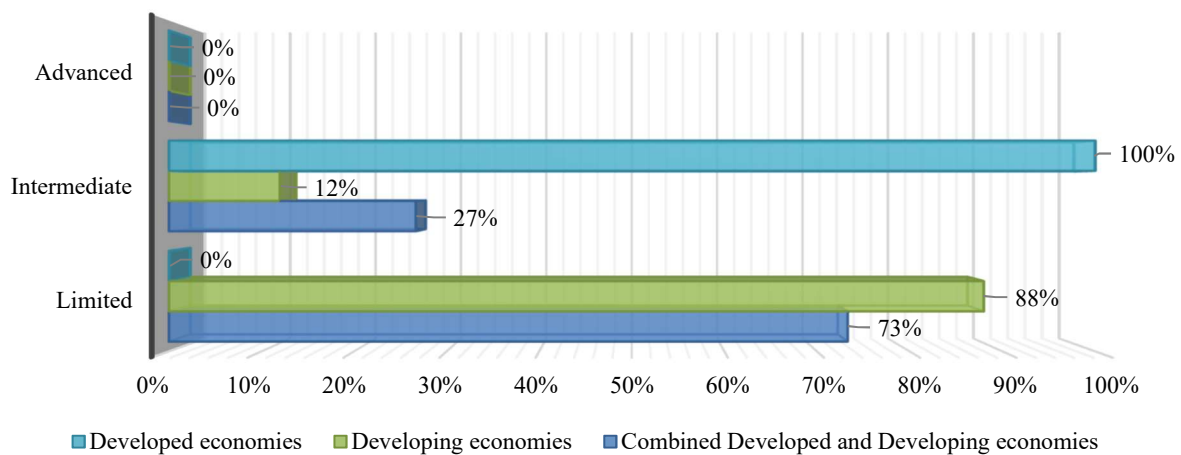
The evaluated responses were categorised according to three categories, namely 'advanced', 'intermediate' and 'limited' responses. An 'advanced' digital response was allocated to a participant in the following circumstances. These are, first, that the tax administration system integrates and consolidates with the natural ecosystem of business and regulatory framework (e.g., accounting systems, financial institutions, digital service platforms, cryptocurrency platforms and payment systems). The system, furthermore, allows taxes to interact seamlessly as a business transaction occurs, whereby taxes are collected and verified in (near) real-time. Tax returns for all tax types are pre-populated and assessed based on the data collected within this digitally connected ecosystem. Tax assessments are issued by the tax authority and the taxpayer verifies and confirms the accuracy of the assessment within a specified timeframe. The tax administration system therefore reduces the time and money spent by the tax compliant taxpayer, but significantly increases the time and money spent by non-compliant taxpayers.

An 'intermediate' digital response was allocated to participating tax authorities whose tax administration systems have the ability of advanced data analysis of data collected from taxpayers and third parties coupled with the information technology that supports advanced data input and analysis. Taxpayers either receive electronic tax assessments with limited time to confirm the accuracy and completeness or the tax authority calculates the due taxes in (near) real time and provides taxpayers with limited time to verify the accuracy and completeness of the tax authority's tax calculations⁵ for at least the three main tax types (personal income tax, value added tax/goods and services tax (VAT/GST) and corporate income tax). The registration, submission and payment process for all tax types are, however, digitalised.

A 'limited' digital response was allocated where the participating tax authorities' tax administration systems are digitalised with the ability to access third party data, pre-populate tax returns and calculate the tax liability, but the data used is inaccurate and incomplete. A 'limited' response was, furthermore, allocated to tax authorities in cases where the tax administration system was either partially digitalised (not all tax types were digitalised yet) or not digitalised at all, which requires the taxpayers to physically visit the tax branches in order to register, submit or pay their taxes. The results of the interviews are presented in Figure 1.

⁵ It should be noted that the limited time period provided to a taxpayer to verify the accuracy and completeness of the assessment is only for administrative purposes. It does not take away the taxpayer's legal right to re-open the assessment within a three to five-year period (guided by jurisdiction-specific tax legislation) in cases where the taxpayer would like to make adjustments to the tax assessment.

Fig. 1: Digital Response to Optimise the Tax Administration System within the Digitalised Economy



Source: Authors.

None of the participants operated at an advanced or optimised tax administrative level, as defined in this study. All (100%) of the participating tax authorities from developed economies and 12% of the participants from developing economies reflected an intermediate digital response to optimise tax administration within the digitalised economy. However, 88% of participants from developing economies reflected a limited digital response to optimise tax administration within the digitalised economy.

Other observations that were made include the fact that advanced technology is applied to inaccurate and incomplete taxpayer data. An example includes the application of self-assessment and government calculated taxes by using inaccurate and incomplete taxpayer data. This imbalance in technology and data maturity increased the taxpayer's time and money spent to be tax compliant instead of reducing the taxpayer's expenses and therefore it lowered the participants' overall digital response. A number of participating tax authorities that reflected limited digital responses were observed to offer online tax submission and payment services for only the main tax types, such as employee taxes, corporate income taxes and personal income taxes. These services are, however, not extended to other tax types, such as estate, dividend and/or donation taxes and are not currently digitalised service offerings to taxpayers. Therefore, the services are only partially digitalised. The basic digital service offerings, such as the respective official websites, online tax registration and tax submission and payment processes (if available) of the majority of participants with 'limited' responses were observed to be complex in comparison to the simplicity of the participants with 'intermediate' response ratings.

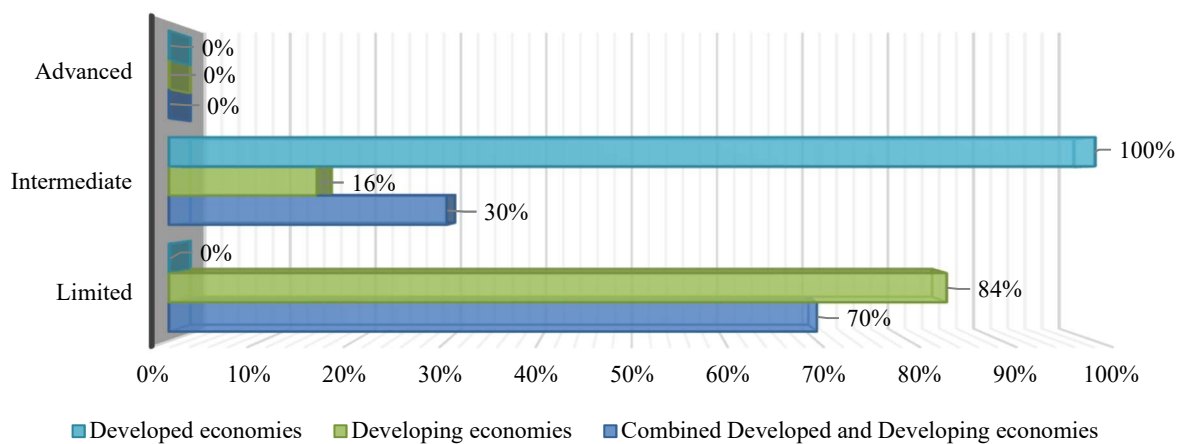
In addition, a culture of creativity and innovation was observed among participants with intermediate digital responses. Creative spaces and 'sandboxes' were created that allow

the workforce to share, innovate and design new ideas and service offerings. A culture of multi-functionality was also observed in some instances where the digital workforce had multidisciplinary backgrounds, which aligned with the tax administration process spanning from operations, digital and data to customer service offerings. Furthermore, the respective tax authorities’ leaders demonstrated their understanding of the impact of digital transformation on an optimised tax administration system by implementing clear and focused long-term digital strategies supported by the required capital investment.

4.2 Data science, automation and artificial intelligence (AI)

Data science, automation and AI are critical elements with regard to the achievement of the five digital strategic objectives identified in section 3. In order to assess the current level of utilisation of these tools by the selected tax authorities, the following question was posed to the participants: ‘*To what extent does your tax authority use big data, automation and artificial intelligence? (limited, intermediate, advanced)*’. The results are summarised in Figure 2 below.

Fig. 2: Level of Utilisation of Big Data, Automation and AI



Source: Authors.

The utilisation of big data, automation and AI was regarded as ‘advanced’ in instances where only critical data (right data) was collected by the participants, while the tax authority securely connected to other data required (refer to section 4.3 below). Data is processed and is consolidated in order to maximise the benefit of data science and analysis. The data is then used at an enterprise level for tax administration purposes instead of being used in functional siloes. The participants’ tax administration system, furthermore, has the ability to collect and ingest structured and unstructured data from traditional and digital platforms with the capability to share data nationally and

internationally. All stages of the data lifecycle,⁶ where possible, are automated. The tax authority's data integrity is high and utilises AI across the organisation to its maximum extent, with limited human intervention for governance purposes.

In cases where the participating tax authorities collected data from various data sources (internally and externally, including digital platforms) and where the data is accurate, complete and of good quality, the authority's utilisation of big data, automation and AI was deemed 'intermediate'. In these cases, the data is further utilised across the organisation for various purposes, spanning the enhancement of service offerings, analysis of taxpayer behaviour, risk management, informed decision-making and policy reform. Automation is used to some extent, and the use of AI is limited or absent.

A 'limited' response was allocated in cases where the data was not accurate and complete and/or it was not considered or used across the organisation. The data was, furthermore, stored in siloes with limited ability to collect data from platforms associated with the digitalised economy. The use of automation was limited, and the use of AI was absent. A 'limited' response was also allocated in cases where participants have not automated the tax submission and payment process, which resulted an imbalance between technology and data maturity levels.

None of the participating tax authorities reflected an advanced big data, automation and AI response to tax administration within the digitalised economy. This was in most instances due to the fact that an optimised data management strategy was not followed and/or data was stored in siloes and advanced AI was not implemented to its full extent by any of the participants, despite a fairly advanced implementation of big data science. An intermediate rating was allocated to all (100%) of the participants from developed economies and 16% of the participants from developing economies regarding the utilisation of big data and automation as tools for tax administration within the digitalised economy. A limited response was allocated to 84% of participants from developing economies with regards to the utilisation of data science and automation as tax administration tools within the digitalised economy.

4.3 Data management strategy (data collection vs. data connection)

Data management and governance within the digitalised economy has become an imperative and critical function of tax authorities globally. This is mainly due to the increased amount of data that is and will be collected in future, the sensitive nature of data collected by tax authorities and the related legislative requirements associated with data collection and storage. The establishment of a balance between collected data vs. data connection is therefore becoming a critical consideration to tax authorities worldwide. Therefore, the following question was posed to the participants: *'Does your tax authority collect all data or collect only critical (right) taxpayer-related data and connect to the rest of the data as and when needed (collection vs. connection)?'*

The majority of tax authorities interviewed still collect and store all tax-related data collected from either taxpayers and/or third parties such as financial institutions, international authorities and government institutions. Some of the leading tax authorities also started to collect data from digital and cryptocurrency platforms, payment

⁶ Data lifecycle refers to the phases by which the data enters the system until it leaves. This cycle typically consists of the following seven phases: data generation, data transmission, data storage, data access, data reuse, data archiving and data disposal (El Arass, Tikito & Souissi, 2017, pp. 1-9).

intermediaries and e-invoicing data. The latter significantly increases data storage, management and processing costs as well as the related governance risks such as cybersecurity and data integrity breaches. It was, furthermore, observed that the majority of participating tax authorities maintain redundant data that are not utilised to add value to the tax administration process.

In order to address the above challenges, an optimised data management strategy that identifies critical tax administration data that must be collected and other relevant data which can be accessed through secure data connections, is thus critical. Data connection refers to the collaboration with relevant third parties and stakeholders in order to have (near) real-time access to relevant tax data and information on demand without having to collect and store the data. This will enable tax authorities to have access to standard tax administration and special purpose tax data without the related cost and risks associated with collecting and storing it onsite. Technology such as secure automated programming interfaces can be used to enable the recommended connection(s).

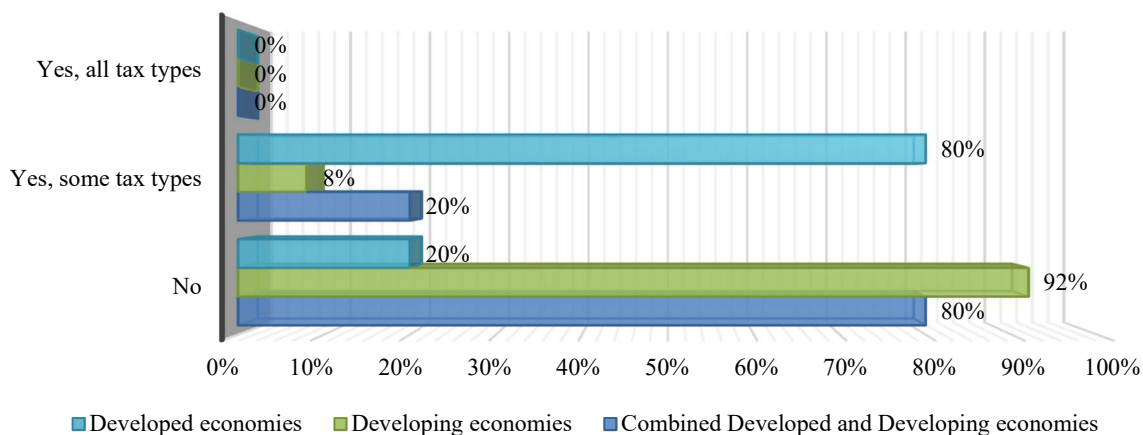
4.4 Data architecture (data stored in siloes or consolidated data warehouses)

The utilisation of consolidated data will be critical for efficient and effective risk analysis as well as enhanced taxpayer service delivery (strategic objectives 1, 2 and 3). The following question was posed to the interviewee: *'Is your tax authority's data used for data analysis consolidated or in siloes?'*

Of the participating tax authorities, 90% store their collected data in siloes or islands, which limits the optimal use of data for purposes of tax risk identification, taxpayer service delivery and any other application of data science. The three participants that use consolidated data warehouses were of the opinion that the specific option is associated with an increased infrastructure and storage cost, as well as a significantly higher cyber security risk. Cybersecurity is in these cases especially high due to the highly confidential nature of taxpayer information collected. The benefits, however, outweigh the associated cost and the cybersecurity risks are mitigated by relevant internal controls. Another observation made during the study is the underutilisation of collected customs data due to the siloed data or island storage architecture adopted by the majority of the participants.

4.5 Tax ecosystems/(near) real-time tax collection

It is predicted that tax administration will become part of normal business transactions and that tax authorities will collect taxes in (near) real-time (strategic goals 1 and 2). The following questions were posed to the selected tax authorities: *'Does your tax authority currently collect tax in (near) real time? (No, some tax types, all tax types)'*. The results are presented in Figure 3 below.

Fig. 3: (Near) Real-Time Tax Collection

Source: Authors.

None of the participants reflected an ‘advanced’ digital response with regards to the implementation of a natural tax ecosystem and/or (near) real-time tax collection systems in terms of which all tax types are collected in (near) real-time. Eighty per cent of the participants from developed economies and 8% of the participants from developing economies have started to collect some of the tax types in (near) real time. The participants that are currently collecting taxes in (near) real-time implemented it per tax type and started with pay-as-you-earn or employment taxes. They subsequently phased in (near) real-time tax collection of indirect taxes. Twenty per cent of participants from developed economies and 92% of participants from developing economies do not yet apply (near) real-time tax collection.

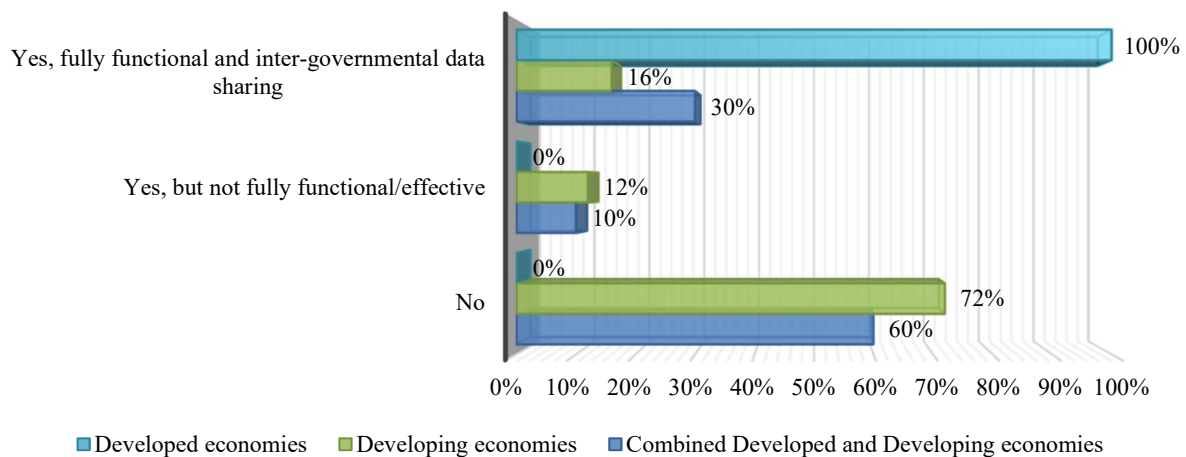
The participants from developing economies noted challenges for the implementation of (near) real-time tax collection, such as budgetary constraints, capability shortages, insufficient internet connectivity, lack of political support, political interference, IT illiteracy of taxpayers and cultural preferences of taxpayers. The majority of participants, however, indicated that they would like to move to a (near) real-time tax collection system in the near future.

4.6 National and international data sharing and collaboration

The digitalisation of the economy allows tax authorities to collect and connect to relevant taxpayer data from other government entities, as well as key stakeholders, such as financial institutions and digital platforms, both locally and internationally. The extent to which the tax administrations are able to collect and ingest tax-related national and international data (strategic objective 3) will also enable them to reach strategic objective 1. Digitalised governments are enabled by the digitalisation of the economy

and will play an imperative role in tax authorities' ability to collect tax-related data. The following question was posed to the participants: *'Does your country have an "e-government" strategy where all relevant departments are digitalised and where common information regarding a taxpayer can be shared inter-governmentally? (No, yes, but limited effectiveness to date, yes, fully functional and inter-governmental data sharing)'*. The results follow in Figure 4.

Fig. 4: E-Government and Inter-Governmental Data Sharing



Source: Authors.

The results indicate that 100% of participants from developed economies and 16% of participants from developing economies share tax-related data inter-governmentally on a domestic level. Data sharing may, however, only be to, from or between specified agencies, as guided by the relevant legislation. Twelve per cent of participants from developing economies indicated that inter-governmental data sharing is to some extent used. Participants in this category indicated that data is shared cross-governmentally in instances where the departments have been digitalised, but that challenges are experienced regarding the quality of the data. All departments, furthermore, have not digitalised their systems which impacts the completeness of the collected taxpayer data. Seventy-two per cent of the participants reflected that no inter-governmental data sharing is possible due to the lack of digitalised governmental systems. The majority of participants indicated that their governments are considering, or are in the process of, digitalising their systems.

The results (as set out in Figure 4), however, only provide insight regarding domestic digital exchange of tax-related information. The interviews and literature study indicated that international sharing of tax-related information among tax authorities and other relevant stakeholders has also commenced. In order to prevent base erosion and profit shifting, the OECD recommends CbC reporting under Action Plan 13 of its Base

Erosion and Profit Shifting (BEPS) project.⁷ In terms of this initiative, multinational entities (MNEs) that fall within the scope of the specified reporting requirements must submit specified company-related information in terms of the CbC reporting framework. The submission of the required information is mandatory and should be submitted in terms of the tax authorities' available submission platforms.⁸

In addition, 90 countries globally have already amended their legislation and 25 countries have proposed the required amendments in order to make provision for CbC reporting, as at 15 February 2020 to the multilateral competent authority agreement on the exchange of CbC reports (OECD, 2020b, p. 9). The collected information is, however, not consolidated into a global database, nor is it exchanged automatically. This is due to both digital and legal challenges associated with the sharing of data. Information can currently only be shared among tax authorities upon request in terms of a multilateral competent authority agreement of which 86 agreements have been signed globally, as at 23 July 2020 (OECD, 2020c, p. 31; OECD, 2020d, p. 1). Another OECD-led initiative to curb tax evasion on foreign income is the Automatic Exchange of Information (AEOI) agreement. Financial institutions around the world are obliged to collect information on financial accounts held by non-residents and share prescribed information with their local tax authorities. The latter, in turn, share it with the relevant tax authority of the foreign account holders.⁹ There are currently 112 countries that undertook to do their first exchange of information by at least 2023, with 45 developing countries that have not yet set a date for their first automatic exchange (OECD, 2020e, p. 1).

The feedback from the participants suggested that, although international tax authorities share information as per the above initiatives, challenges are experienced regarding the integrity and format of the data that is received, as well as with the effective and efficient utilisation of the data in order to identify tax risks. While national and international information sharing will be critical for optimised tax administration within a digitalised economy, the above results indicate that national and international tax-related data and information sharing is not yet optimised due to both digital and legal challenges that still require further development and discussion.

5. RECOMMENDATIONS

The research results (as set out in sections 4.1 to 4.6 above) reflect a major difference between participants from developed and developing economies with regard to their digital response to optimise tax administration within the digitalised economy. These results are symptomatic of a general observation made during the study regarding a major difference in the digital maturity levels among the participants. Internal imbalances among data and technology maturity were, furthermore, identified within

⁷ See, for example, Australian Taxation Office, 'Country-by-Country reporting', <https://www.ato.gov.au/Business/International-tax-for-business/In-detail/Transfer-pricing/Country-by-Country-reporting/> (accessed 20 October 2020).

⁸ Australian Taxation Office, 'Country-by-Country reporting', <https://www.ato.gov.au/Business/International-tax-for-business/In-detail/Transfer-pricing/Country-by-Country-reporting/>.

⁹ Findex, 'Global tax authorities to begin sharing information', <https://www.findex.co.nz/insights/article/global-tax-authorities-to-begin-sharing-information> (accessed 20 October 2020).

the participating tax authorities, which negatively influenced their overall ability to administer and collect taxes within the digitalised economy.

Due to the fact that digitalisation eliminated country borders and globalised the economy, it might be argued that a global minimum standard for digital tax administration systems should be set in order to regulate the particular environment. This will serve a dual purpose by first ensuring a minimum, standardised tax administration service offering for highly digitalised MNEs and tax-compliant participants within the digitalised economy. Secondly, it will reduce the tax administration and collection gap among tax administrations from developed and developing economies.

Black (2002, p. 25) defines regulation as ‘the sustained and focused attempt to alter the behaviour of others according to defined standards and purposes with the intention of producing a broadly identified outcome or outcomes’. Black (2002, p. 25) states that this may be achieved by using mechanisms such as standard-setting, information-gathering and behaviour modification. Reflecting on the research results and the objective of regulations, as defined by Black (2002, p. 25), the first recommendation we make is the independent formal assessment of international tax authorities’ current digital (and possibly other such as organisational and political) maturity levels in order to identify the global level of assistance required to optimise tax administration within the digitalised economy. It is recommended that a standard list of elements for consideration are provided in order to ensure that international tax authorities consider the same digital (and other) maturity elements.

Secondly, we recommend that minimum digital maturity standards are set for tax authorities globally and regulated by an independent or international body in order to ensure tax administration systems adhere to at least a minimum level of standard within the digitalised economy. Third, it is recommended that international consensus is reached on what an ‘optimised’ tax administration system should look like within the digitalised economy and how tax authorities globally will achieve this goal considering the various digital and legal challenges, as well as the specific challenges of tax authorities from certain developing economies. A global, long-term strategy should be compiled, implemented, monitored and adjusted as and when required in order to optimise tax administration within the digitalised economy.

6. CONCLUSION

The research results highlight the fact that data and technology will play a fundamental role in the realisation of tax authorities’ strategic goals regarding the digitalisation of the economy. While these identified goals are all necessary building blocks towards an optimised tax authority, there was only limited literature which could, however, be identified regarding the composition, architecture and key features of an optimised tax administration within the digitalised economy and how international tax authorities envision reaching such an advanced state of operation.

Section 4 above indicates that the digital responses to administer taxes within the digitalised economy of participants from developed economies and a minority of participants from developing economies are in most instances on an intermediate level. The digital responses of the majority of participants from developing countries to administer taxes within the digitalised economy are limited. General challenges indicated by these participants include budgetary constraints, digital connectivity

limitations (across data and technology), political interference and the taxpayers' cultural preferences.

None of the participants reflected an 'advanced' response as defined for the purposes of this study in relation to their tax administration systems within the digitalised economy. The majority of participants from developed economies and a minority of participants from developing economies reflected an 'intermediate' digital response. The majority of the participants from developing economies reflected a 'limited' digital response in this regard and the overall response for the combined sample was 'limited'.

The research results, furthermore, indicate that none of the participants utilised big data, automation and AI on an 'advanced' level, as defined for the purposes of this study. The combined research results indicate that 30% of the participating tax authorities utilised big data and automation on an intermediate level, while 70% utilised it to a limited extent due to challenges, such as data integrity and the partial digitalisation of tax administration systems. A significant number of participants also still utilise data in siloes, which prohibits them from realising the full potential of data science, automation and AI. The research results further indicate that national and international data sharing is not currently on a standard that will ensure optimised tax administration within the digitalised economy. This is due to both digital and legal challenges and considerations.

An interesting observation of the study is that the overall digital maturity of tax authorities is negatively influenced where an imbalance exists between either data availability and/or quality and technology capability. The opposite is also evident as a balanced ecosystem between quality data and technology seems to lead to an increase in the efficiency and effectiveness of tax administration. The overall expectation is that tax authorities that follow a balanced and innovative approach to introduce and use data and technology can expect a systematic increase in the taxes that are collected.

In summary, the research results suggest that some participating tax authorities have demonstrated commendable responses to enhance their existing tax administration systems. However, none of the participants' responses resulted in an optimised tax administration system within the digitalised economy (as defined in section 4.1).

7. FURTHER CONSIDERATION AND STUDIES

The study's findings suggest that there might be a direct correlation between the balance in maturity levels between data and technology and the successes experienced in administrating and collecting taxes. The study further suggests that tax administration and collection are negatively affected in cases where an imbalance exists in maturity levels between the data and technology. The testing of the latter theory and quantification of the various outcomes with reference to the impact on increased taxes collected and the decrease in auditor investigation cost would add valuable information to the business sector and the academia alike.

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